U. S. Government

RESEARCH REPORTS

March 5, 1964
Vol. 39 No. 5

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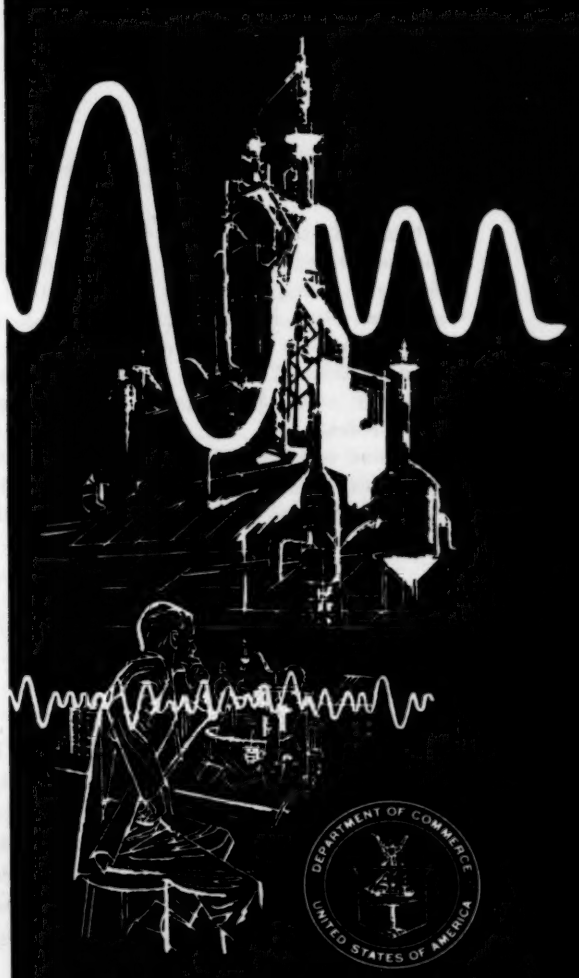

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Atlanta, Ga. 30300

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Chicago, Ill. 60616

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Pittsburgh, Pa. 15213

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Cincinnati, Ohio 45200

Detroit Public Library
Detroit, Michigan 48200

University of Utah
Salt Lake City, Utah 84100

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-419 101 Div. 1, 30, 9, 2
OTS price $11.50

Princeton U., N. J.
THE ACQUISITION, REDUCTION, AND ANALYSIS OF TURBULENCE DATA ASSOCIATED WITH PA CONFIGURATION APPROACHES TO CARRIER LANDINGS,
by W. J. Oldmixon. July 63, 1v. Rept. no. 653
Contract N600 19S9256

Unclassified report

Descriptors: (*Jet fighters, Turbulence), Naval aircraft, Carrier landings, Stability, Yaw, Aerodynamic control surfaces, Deflection, Flight testing, Instrumentation, Telemeter systems, Data processing systems, Differential equations, Analog computers, Computer logic, Atmospheric motion, Simulation, Gust loads, Ailerons, Spoilers, Tails (Aircraft), Aerodynamic loading.

An analysis was made of flight test data to obtain information representing the atmospheric turbulence inputs to the test aircraft. The basis of the method was the use of the linearized equations of motion of the aircraft, with the addition of certain terms representing the aerodynamic effects of the turbulence on the aircraft. These equations were set up on an analog computer and verified by the technique of matching transient response flight data. Then, through the use of a feedback system, the desired turbulence quantities were obtained as system outputs. Inputs to the system were the aircraft response and control deflections, obtained from the flight test data. The method was found to be valid, assuming the aircraft analogue was correct. The resulting data appeared suitable for further analysis to determine its statistical qualities. (Author)

AD-419 126 Div. 1
OTS price $15.00

United Aircraft Corp., East Hartford, Conn.
INVESTIGATION OF CONTROL AND STABILITY AUGMENTATION REQUIREMENTS FOR TANDEM TILTING DUCTED PROPELLER VTOL TRANSPORTS,
by James W. Clark, David P. Miller, and Robert A. Gallant. July 63, 207p. Rept. no. R1624 5
Contract NOw61 0848

Unclassified report

Descriptors: (*Transport planes, Tilt-wings), (*Vertical take-off planes, Flight control systems), Shrouded propellers, Propellers (Aerial), Control, Stability, Flight simulators, Analog computers, Theory, Handling, Adaptive control systems, Programming (Computers), Simulation, Hovering, Pitch (Motion), Yaw, Aerodynamic characteristics, Mathematical prediction, Military requirements.

Theoretical and analog computer investigations were conducted to determine the control and stability augmentation requirements for tandem tilting ducted propeller VTOL transports. The type of aircraft considered had performance capabilities similar to those required for the Tri-Service VTOL Transport. (Author)

AD-419 190 Div. 1
OTS price $1.60

Marine Corps Landing Force Development Center, Quantico, Va.
HELICOPTER COVER.
Final rept.
4 Oct 63, 11p.
Proj. 51 58 03

Unclassified report

Descriptors: (*Helicopters, Protective coverings), (*Protective coverings, Helicopters), Aircraft carriers, Storage, Corrosion inhibition, Damage, Reduction.

Tests were conducted on a covering for ready to fly type storage of helicopters on carrier flight decks. The covers are manufactured from ten ounce Army Duck treated with a dry type water repellent finish, and are tailored to reduce possible wind damage. Extensive use of zippers and fasteners were made to reduce the installationtime and the number of personnel required to don and doff the cover. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-419 052 Div. 2, 30
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
OBJECTIVE AND DYNAMICAL STUDIES OF TROPICAL WEATHER PHENOMENA.
Final report no. 4 1 June 62-31 May 63,

by R. M. Endlich and R. L. Mancuso. Aug 63, 47p.
Contract DA36 039SC89092 Project 3A99 27 025 09 00

Unclassified report

Descriptors: (*Weather forecasting, Computers), (*Climatology, Tropical regions), Data processing systems, Mathematical analysis.

The special difficulties of weather analysis in the tropics are reviewed. The bulk of the report describes investigations and tests of objective (computer) techniques that are applicable to tropical usage. The advantages of analysing layer-averaged winds, temperatures, heights, and humidity are described. Layer-averaged winds are utilized in the computation of a stream function. The mathematical basis of the ''direct method'' of stream function computation is given and the computer procedure is outlined. The results are compared with independent subjective analyses and show excellent agreement. (Authors)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-419 071 Div. 2, 16
OTS price $22.25

Washington U., Seattle.
PHYSICAL, CHEMICAL AND BIOLOGICAL DATA FROM THE NORTHEAST PACIFIC OCEAN: COLUMBIA RIVER EFFLUENT AREA, JANUARY - JUNE 1961.
July 63, 405p. TR86; Ref M63 13
Contract Nonr47710, Proj. NR083 012
Unclassified report

Descriptors: (*Oceanology, Data), Temperature, Collecting methods, Salinity, Oxygen, Determination, Tables, Phosphates, Carbon, Radioactive isotopes.

AD-419 082 Div. 2
OTS price $10.10

Wisconsin U., Madison.
EMPIRICAL AND THEORETICAL STUDIES OF ATMOSPHERIC ENERGETICS.
Annual rept.
by E. G. Astling, R. A. Bryson, R. J. Deland, J. A. Dutton and D. R. Johnson. 15 Sep 62, 114p.
Contract CWB10240.
Unclassified report

Descriptors: (*Energy, Atmosphere), (*Atmosphere, Energy), Meteorology, Sun, Energy conversion, Heat, Atmospheric motion, Cooling, Satellites, Data, Infrared radiation.

Differential heating of the atmosphere by the sun has been long recognized as the source of the kinetic energy of the atmosphere. However, the mechanisms through which the differential heating produces and maintains the kinetic energy of various scales of atmospheric circulation remains as one of the most challenging problems of meteorology. The research presented here, in the form of an annual report, consists of five papers representing various approaches to this basic problem. (Author)

AD-419 110 Div. 2
OTS price $1.10

Washburn U., Topeka, Kans.
PHOTOELECTRIC PHOTOMETRY OF ECLIPSING BINARY SYSTEMS.
Final rept., 1962-1963,
by R. S. Alexander. 4 Oct 63, 1p.
Grant Nonr G00039 62, Proj. NR046 185
Unclassified report

Descriptors: (*Binary stars, Light), Measurement.

AD-419 144 Div. 2, 30 15
OTS price $11.50

Aeronutronic, Newport Beach, Calif.
A GENERAL PERTURBATIONS DIFFERENTIAL CORRECTION PROGRAM,
by J. L. Arsenault, J. R. Kuhlman and L. W. Stumpf. 1 Aug 63, 147p. Pub. U2201
Contract AF19 628 562
ESD TDR63 432 Unclassified report

Descriptors: (*Programming (Computers), Celestial mechanics), (*Satellites, Orbital trajectories), Tracking, Solar Radiation, Perturbation theory, Drag, Atmospheric motion, Least squares method, Differential equations, Integration, Numerical methods & procedures, Equations, Errors, Corrections, Matrix algebra, Vector analysis, Programming languages, Punched cards, Tables.

An experimental computer program is described, which calculates Earth Satellite ephemerides, corrects orbit elements and evaluates the effects of various terms of the bulge perturbation theory. Perturbations by solar radiation pressure and atmospheric drag are also represented. The differential correction employs a weighted least-squares reduction. Formulation, flow charts, input formats and sample cases are given. (Author)

AD-419 159 Div. 2
OTS price $1.10

Minnesota U., Minneapolis.
A SEARCH FOR FAINT BLUE STARS XXXIII. PROPER MOTIONS FOR 148 PHL STARS XXXIV. PROPER MOTIONS FOR 24 BLUE STARS IN ORION,
by Willem J. Luyten and Helen S. Hughes.
8 June 63, 10 p.
Contract Nonr1892 00
Unclassified report

Descriptors: (*Stars, Data), Intensity, Motion, Celestial mechanics, Tables.

AD-419 163 Div. 2, 30
OTS price $4.60

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept.
Aug 63, 1v.
Contract Cwb10704
Unclassified report

Descriptors: (*Weather forecasting, Data transmission systems), (*Data processing systems, Meteorology), Meteorological radar, Meteorological parameters, Cloud cover, Visibility, Fog, Rainfall, Statistical processes.

AD-419 182 Div. 2, 15
OTS price $5.60

Aeronautical Chart and Information Center, St. Louis, Mo.
THE GEOMETRIC BASIS OF ANALYTIC TRIANGULATION,
June 63, 46p.
ACIC Ref. Pub 4 Unclassified report

Descriptors: (*Photogrammetry, Analytic geomtry), Instruction manuals, Matrix algebra, Geometry.

Recent ACIC activities in the field of analytic photogrammetry have developed a requirement among technicians for knowledge of the mathematical essentials of analytic aerotriangulation. There are six chapters in this manual. The first chapter gives a geometric definition of the general aerotriangulation problem and reviews some fundamental propositions from solid geometry which are necessary for further study. Subsequent chapters deal with the point in space, the line in space, the plane in space, and systems of coordinates with matrix notation for transforming coordinates from one reference system to another system. The transformation from a space coordinate system to a geodetic coordinate system based on a spheroidal earth is a specfic consideration. The last chapter deals with practical applications. (Author)

AD-419 238 Div. 2
OTS price $7.60

Aerospace Information Div., Washington, D. C.
SOVIET GEODESY, CARTOGRAPHY, AND INSTRUMENTATION.

NEW GEODETIC INSTRUMENTS (PRELIMINARY). COMPILATION OF ABSTRACTS, SUMMARIES AND EXTRACTS.
22 Aug 63, 69p.
AID Rept. no. P63 107; Rept. no. 1
Unclassified report

Descriptors: (*Geodesics, Instrumentation), (*Instrumentation, Geodesics), (*Abstracts, Instrumentation), Mapping, Theodolites, Surveying, Range finding.

AD-419 279 Div. 2
OTS price $1.10

Maryland U., College Park.
SUMMARY OF RESULTS OF RESEARCH CONDUCTED UNDER PROVISIONS OF GRANT AF-AFOSR-62-284.
Technical rept. 1 Jan-31 Dec 62.
Mar 63, 2p.
AFOSR 5209 Unclassified report

Descriptors: (*Cosmic rays, Solar radiation), (*Solar radiation, Aurorae), Neutron counters, High altitude, Experimental data, Neutron detectors, Diurnal variations, Fast neutrons.

AD-419 297 Div. 2
OTS price $1.60

General Mills, Inc., Minneapolis, Minn.
TIME SECTIONS OF THE ZONAL WINDS AT TROPICAL STATIONS.
Interim progress rept. no. 3, 1 Jan-31 Mar 63, by A. D. Belmont and D. G. Dartt. 1 Apr 63, 13p.
Rept. no. 2383
Contract DA36 039sc89211, Proj. 3A99 27 005 09
Unclassified report

Report on Tropical Upper Air Studies.

Descriptors: (*Upper atmosphere, Wind), (*Wind, Tropical regions), Meteorological parameters, Stratosphere, Troposphere, Periodic variations, Barometric pressure, Atmospheric motions.

Three additional time sections of the monthly mean upper air winds have been prepared for Leopoldville, Eniwetock, and Johnson Island. These graphs confirm the irregularity of the observed zonal wind directions in the tropical stratosphere, and show the complex relationship of the stratospheric to high tropospheric westerlies. (Author)

AD-419 379 Div. 2
OTS price $31.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC RAY VARIATIONS,
by L. I. Dorman. 1957, 726p. Library AFL2819
Unclassified report

Descriptors: (*Cosmic rays, Textbooks), Radiation measurement systems, Statistical analysis, Muons, Meteorology, Diurnal variations, Magnetic storms, Solar wind, Terrestrial magnetism, Cosmic ray bursts, Periodic variations.

Experimental and theoretical methods of investigating the variations of cosmic rays (time variations of their intensity) are given. The accumulated experimental material is systematized and analyzed, and the hypotheses that have been proposed for the origin of various types of variations are critically considered. A theory is proposed for the origin of the variations, and their correlation with various geophysical and astrophysical phenomena is examined, in particular their correlation with the properties of the solar corpuscular streams and with the electromagnetic conditions in the neighborhood of the earth, in the solar atmosphere, in interplanetary space, and in the Galaxy. This work is intended for scientists occupied with cosmic-ray physics, astrophysics, geophysics, or meteorology, for students of advanced courses in these specialties, and for workers in the network of stations for continuous cosmic-rav observations. (Author)

AD-419 445 Div. 2
OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
THE RESPONSE OF SOILS TO DYNAMIC LOADINGS. THE DYNAMIC PASSIVE PRESSURE PROBLEM FOR SAND,
by William C. Kerr. May 63, 1v. Research rept. no. R63 30; Rept. no. 18
Contract DA22 079eng224
Unclassified report

Descriptors: (*Sand, Deformation), Motion, Pressure, Photographic analysis.

The dynamic counterpart of the passive earth pressure problem was investigated (in a preliminary way) both experimentally and theoretically. The experiments revealed that the pattern of sand movements is quite different for static and for very rapid loadings. With rapid loadings, a 'crater' is excavated behind the wall, presumably as the result of 'spalling' of the cohesionless surface. (Author)

AD-419 458 Div. 2, 25, 30
OTS price $1.10

Denver U., Colo.
ATMOSPHERIC INFRARED OPTICS. ATTENUATION AND FLUX MEASUREMENTS.
Progress letter 1-31 July 61.
31 July 61, 2p.
Contract AF19 604 7429
Unclassified report

Descriptors: (*Infrared spectroscopy, Measuring devices (Electrical and electronic)), (*Balloons, Launching), Radiometers, Attenuation, Flight paths, Measurement, Fluxmeters, Optics, Cloud cover, Wind.

AD-419 481 Div. 2
OTS price $1.10

California Inst. of Tech., Pasadena.
SOME DECIMETER OBSERVATIONS OF VENUS DURING THE 1962 CONJUNCTION,
by B. G. Clark and C. L. Spencer. 1963, 5p.
Unclassified report

Descriptors: (*Radio astronomy, Radiation measurement systems), (*Venus, Measurement), Radiators, Ultrahigh frequency, Interferometers, Noise, Telescopes, Parabolic antennas, Atmospheric temperature, Planetary atmospheres, Blackbody radiation, Brightness.

The flux from Venus was measured at various frequencies. An attempt was made to measure the size of the planet at a wavelength of 9.4 cm with an interferometer with a baseline of 5184 wavelengths aligned east-west. Only a very small part of the amplitude-spacing spectrum was observed, but the observations are not what would be expected of a uniform or limb darkened disk. (Author)

AD-419 507 Div. 2
OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION

OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 7, 1 Apr-30 June 63,
by E. A. Mueller and G. E. Stout. June 63, 10p.
Contract DA36 039sc87280, Proj. 3A99 07 001 01
Unclassified report

Descriptors: (*Meteorological radar, Radar echo areas), (*Raindrops, Distribution), Intensity, Rainfall, Radioactive fallout, Trafficability, Evaporation, Atmospheric precipitation, Meteorological instruments, Cameras, Programming (Computers), Data processing systems, Atmospheric temperature.

Three raindrop cameras were operated on the East Central Illinois Raingage Network during the period and 38 rolls of data have been collected. A computer program was written to determine the best estimate of rainfall rate subject to a criterion for insuring that under-estimates of large magnitude are not made. Results of a study evaporation effects on raindrop distributions are presented. (Author)

AD-419 521 Div. 2
OTS price $3.60

San Andres U., La Paz (Bolivia).
STUDY OF VARIATIONS AND SOLAR MODULATIONS.
Final technical rept.,
by Ismael Escobar V. Oct 62, 1v.
Contract AF AFOSR60 13
AFOSR 52 15 Unclassified report

Descriptors: (*Cosmic rays, Intensity), (*Solar atmosphere, Electromagnetic fields), Solar disturbances, Solar radiation, Solar flares, Measurement, Cosmic ray telescopes, Neutron counters, Satellites (Artificial), Magnetic storms, Periodic variations, Scintillation counters, Diurnal variations, Tables.

Information was revealed by satellite measurements about the conditions existing in interplanetary space. However, these measurements were restricted to isolated regions and have not succeeded in providing a broad overall picture of the electromagnetic environment. For this reason, cosmic rays which sample the interplanetary state over large regions, provide us in their time variations with a valuable clue as to the way in which the sun influences the interplanetary weather. It is of great interest to establish by what mechanisms the sun controls the intensity of cosmic radiation sampled at the earth. Many modulation mechanisms were forthcoming as a result of the evergrowing interest and development in plasma physics. It is the testing of these models against observation that will provide us with a detailed description of the far reaching effects of solar activity. (Author)

AD-419 564 Div. 2
OTS price $4.60

Stockholm U. (Sweden).
ON THE FORMULATION OF STATISTICAL METEOROLOGY,
by Walter Freiberger and Ulf Grenander.
July 63, 45p.
Contract DA36 039SC87222
Unclassified report

Invited paper prepared for the European Meeting of the Institute of Mathematical Statistics, Copenhagen, July 8-12, 1963.

Descriptors: (*Meteorology, Statistical analysis), (*Weather forecasting, Models (Simulations)), Stochastic processes, Meteorological phenomena, Statistical functions, Equations, Partial differential equations, Air mass analysis, Atmospheric motion, Mathematical models.

AD-419 592 Div. 2, 25
OTS price $9.60

RAND Corp., Santa Monica, Calif.
THREE PAPERS ON RADIATIVE TRANSFER FROM ''INVESTIGATIONS OF THE PHYSICS OF THE ATMOSPHERE,'' NO. 3, ACADEMY OF SCIENCES, ESTONIAN S.S.R., 1962,
by Yu. Mullamaa, O. Avaste, H. Moldau, and K. S. Schifrin, trans. by D. Deirmendjian.
Sep 63, 97p. Memo. no. RM3869PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Light, Atmosphere), (*Solar radiation, Atmosphere), Wave transmission, Reflection, Surfaces, Water, Scattering, Absorption, Heat transfer.

Contents: The Diffuse Reflection and Transmission of Light by Two Isotropic Media Separated by a Rough Surface; The Spectral Distribution of Direct and Diffuse Radiation; and An Approximate Solution to the Problem of Radiative Transfer in the Case of Anisotropic Scattering.

AD-419 619 Div. 2
OTS price $1.10

Denver U., Colo.
(No title).
Progress letter no. 28, 1-31 Jan 63.
31 Jan 63, 3p.
Contract AF19 604 7429
Unclassified report

Descriptors: (*Meteorological balloons, Flight), Spectra (Infrared), Solar radiation, Infrared radiation, Measurement, Instrumentation.

AD-419 646 Div. 2
OTS price $1.60

Minnesota U., Minneapolis.
A SEARCH FOR FAINT BLUE STARS. XXXIII. PROPER MOTIONS FOR 148 PHL STARS. XXXIV. PROPER MOTIONS FOR 24 BLUE STARS IN ORION,
by William J. Luyten and Helen S. Hughes.
8 June 63, 10p.
Contract Nonr189200
Unclassified report

Descriptors: (*Stars, Search theory), Astronomical data, Astronomy, Luminescence, Astronomical observatories, Errors, Galaxies, Tables.

AD-419 653 Div. 2
OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
FULL-FIELD SEISMIC MODELLING,
by Ker C. Thomson. June 63, 14p.
Proj. 8652
AFCRL 63 685 Unclassified report

Descriptors: (*Seismic waves, Photoelasticity), (*Models (Simulations), Seismic waves), Seismographs, Photographic images, Stroboscopes, Polarization, Thermosetting plastics, Acrylic resins, Mechanical waves, Stresses, Propagation.

Many of the problems of seismology are too complicated for an analytical approach to be feasible. Model procedures are indicated; but the methods are not sufficiently developed to permit their use in a wide variety of the important problems of seismology. The most frequently used modelling technique utilizes small electromechanical transducers to view the wave as a function of time at a fixed position. In contrast this report discusses a method of viewing and photographing the entire field of the wave simultaneously at all positions. Time dependence is obtained by sequential photography. Excitation of the model is produced by striking it repetitively with a small metal pin operated by the cam follower on a 14-inch flywheel rotating at 30 cps. The models are transparent, permitting visualization and quantitative representation of the wave through the photoelastic effect. The waves appear to stand still or to propagate through the use of stroboscopic illumination and a continuously variable phase relationship between striking and flashing, controllable by the observer. Simultaneous full-field viewing of models up to 16 inches in diameter is possible. Isochromatic and isoclinic photographs of propagating waves in a 12-inch-square model are shown. (Author)

AD-419 669 Div. 2
OTS price $10.10

Geophysics Corp. of America, Bedford, Mass.
VORTEX CLOUD STUDIES.
Final rept.,
by Wen Tang. Apr 63, 116p. Technical rept. no. 63 4 G
Contract CWB10316
Unclassified report

Descriptors: (*Clouds, Vortices), (*Models (Simulations), Clouds), Storms, Pattern recognition, Hurricane tracking, Air mass analysis, Atmosphere motion, Wind, Meteorological radar, Meteorological satellites, Photographs, Barometric pressure, Growth, Physics, Frequency, Numerical analysis, Equations, Stability, Couette flow.

Simple dynamical models are constructed to explain the formation of spiral cloud bands in hurricanes and cyclones. In Model I instability due to a vertical wind shear perpendicular to the mean flow is stressed. This model leads to small or medium scale disturbances; the preferred scale for the spiral cloud bands in hurricanes is computed to be about 25-30 km for the assumed atmospheric parameters. Model II includes the effect of rotation and friction on the instability due to a thermal stratification and a wind shear parallel to the mean wind direction. It is found that the inclusion of the Coriolis effect can make possible the realization of shear instability even when the static stability is positive. The maximum wavelength can be increased as the ratio of the horizontal to vertical eddy viscosity is increased. In Model III the effect of baroclinicity is also considered. (Author)

AD-419 675 Div. 2
OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
A COMPUTER PROGRAM FOR SOLVING THE REACTION RATE EQUATIONS IN THE E IONOSPHERIC REGION,
by Thomas J. Keneshea. Aug 62, 75p.
Proj. 8653
AFCRL 62 828 Unclassified report

Descriptors: (*Ionosphere, Chemical reactions), Ionization, Differential equations, Programming (Computers).

In studies of the mechanisms responsible for the formation of the ionized regions of the atmosphere, one of the problems encountered is the solution of the set of differential equations describing the time dependence of the number density of the chemical species present. For simple cases where only one or two species are involved, there is no particular problem. When all the important constituents are included, however, the solution of these equations becomes very complex. A computer technique is presented that will solve any size set of these differential equations involving any number of chemical reactions. (Author)

AD-419 680 Div. 2
OTS price $4.60

Naval Research Lab., Washington, D. C.
AUTOMATIC WEATHER STATION (GRASSHOPPER) PART I - DESIGN AND MODIFICATIONS 1955-1961.
Interim rept.,
by T. E. Marshall, III. 13 Aug 63, 38p.
NRL 5966 Unclassified report

Descriptors: (*Weather stations, Automatic), Design, Installation, Polar regions, Cold weather tests, Specifications.

Weather information is required from critical areas where routine meteorological observations are not made or can be made only at considerable expense. An automatic weather station (Grasshopper) was developed which is capable of telemetering data from a 15-watt (input to the final) transmitter over distances of hundreds of miles every six hours for several months. The initial models were air deliverable, but in 1959 NRL removed the parachute capability to make it a manual-delivered land station. Present models of this station contain sensors for wind direction, wind speed, air temperature, and barometric pressure. The station transmits in international Morse code in three-letter groups at a word rate of 17 groups per minute which is satisfactory for monitoring by conventional receiving equipment. The received Morse code is converted to weather data by calibration charts supplied with each station. The accuracy of the transmitted weather data is equivalent to a manned station. In addition to the meteorological variables, the station sends its identifying call. Commerically available equipment was used in design and manufacture whenever possible to take advantage of lower costs, easier replacement of parts, and greater reliability. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-419 131 Div. 3
OTS price $1.10

Alderson Research Labs., Inc., Long Island, N. Y.
(No title).
Progress repts. for period ending 31 Aug 63.
20 Sep 63, 9p.
Contract DA18 108AMC201A
Unclassified report

Descriptors: (*Protective masks, Design), Aerosols, Breathing masks, Test equipment, Test methods, Gas leaks, Pressure, Measurement, Isotopes, Krypton.

AD-419 560 Div. 3
OTS price $2.60

ITT Federal Labs., Nutley, N. J.
STUDIES OF THE OUTSTANDING DEFICIENCIES OF THE

Division 3 - CHEMICAL WARFARE EQUIPMENT AND MATERIALS

E41 ALARM.
Bimonthly rept. no. 2,
by M. B. Leeds. Sep 63, 34p.
Contract DA18 108AMC136
Unclassified report

Descriptors: (*Toxic agent alarms, Design), (*Warning systems, Chemical warfare agents), Electronic equipment, Design, Electrometers, Transistors, Electric bridges, Transistor amplifiers, Current amplifiers, Capacitors, Aerosols, Automatic, G agents.

AD-419 625 Div. 3, 22
OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SILVER ACETYLIDES,
by Virginia D. Hogan and Saul Gordon. Aug 60, 15p.
Proj. 504 01 027; Ord. Proj. TS5 5407
FRL TR3 Unclassified report

Descriptors: (*Pyrotechnics, Organic compounds), (*Igniters, Organic compounds), (*Organic compounds, Igniters), Ignition, Silver compounds, Nitrates, High temperature research, Low pressure research, High altitude, Simulation, Explosive materials, Detonation, Stability, Radiation damage, Bibliography, Alkynes.

Research on the three compounds that can be prepared from silver nitrate and acetylene--Ag2C27, Ag2C2.AgNO3, and Ag2C2.6 AgNO3--is traced in detail in this report, on the basis of a comprehensive literature survey compiled by the authors. Experimental work was also done, in which the three compounds were subjected to differential thermal analysis both at ambient pressures and at reduced pressures simulating high altitudes of up to 150,000 feet. The explosion temperatures of the feebly explosive compounds Ag2C2 and Ag2C2.6 AgNO3 (138 C and 300 C, respectively) were found to be substantially unaffected by reduced pressures. However, Ag2C2.AgNO3 exploded violently at 245 C under ambient pressure, and at 195 C at a pressure of one millimeter of mercury. It was concluded that none of these compounds would be suitable as pyrotechnic igniters under conditions of low pressure and elevated temperature because of their relatively low ignition temperatures. Under ambient conditions, they offer no improvement in either thermal stability or brisance over lead azide, which is presently in common use. (Author)

4. CHEMISTRY

AD-419 017 Div. 4
OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio
THE SYNTHESIS OF A VOLATILE CADMIUM CHELATE AND THE STUDY OF ITS VAPOR PHASE REACTION WITH HYDROGEN SULFIDE.
by Albert George Cupka, Jr. May 63, 75p.GNE Phys 63-7

Unclassified report

Masters thesis.

Descriptors: (*Complex compounds, Synthesis (Chemistry), (*Cadmium compounds, Organic compounds), (*Organic compounds, Complex compounds), (*Metalorganic compounds, Cadmium compounds), Films, Crystals, Cadmium, Semiconductors, Physical properties, Vapors, Chemical reactions, Fluorine compounds, Hydrogen compounds, Sulfides, Vapor plating, Chemical analysis, Spectroscopy, Chromatographic analysis, Carbonyl group.

A chemical approach to deposition of thin films or crystals of metal compounds was investigated. It was of interest to determine whether metal chelates would undergo a vapor phase reaction to form the desired products. Reactions to produce materials of importance as semiconductors were of special interest. Two metal derivatives of fluorinated acetylacetone containing cadmium were prepared, one ionic in nature and the other covalent. Composition and structure of the two compounds is presented, together with a few of their physical properties. The covalent cadmium chelate was reacted in the vapor phase with hydrogen sulfide. The experiments were conducted at atmospheric pressure and reaction temperatures of 140 to 240 C. (Author)

AD-419 040 Div. 4, 25
OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE SYNTHESIS AND STUDY OF THE ABSORPTION OF SOME NAPHTHYL SILANES IN THE ULTRA-VIOLET REGION.
by Calvard Scott Allen May 63, 120p. GNE Phys 63 1

Unclassified report

Descriptors: (*Organic compounds, Silanes), (*Silanes, Synthesis (Chemistry), (*Luminescence, Organic compounds), Absorption spectrum, Emissivity, Ultra violet spectroscopy, Phosphorescence, Fluorescence, Cryogenics, Life expectancy, Absorption, Excitation, Metalorganic compounds, Solvent action, Organic solvents, Hydrocarbons, Physical properties, Chemical analysis, Spectra (Visible & ultraviolet), Aromatic compounds, Polycyclic compounds.

Two synthesis schemes were used to prepare eight related naphthylsilanes. The basic absorption and emission properties of these compounds were investigated in the ultra-violet region. These properties include molecular extinction coefficient determinations, fluorescence of glass silanes, fluorescence in cyclohexane and EPA at 298 and 77 K, and phosphorescence in EPA at 77 K. Also mean lifetimes of phosphorescent bands were determined. Molecular extinction coefficient calculations indicate the 1-naphthylsilanes absorb light in direct proportion to the number of naphthalene molecules attached to the silicon atom. No apparent correlation in the absorption of the 2-naphthylsilanes exists. Fluorescence spectra of the 1-naphthylsilanes indicate bands comparable to those of naphthalene. (Author)

AD-419 080 Div. 4, 25
OTS price $8.10

Electro-Optical Systems Inc., Pasadena, Calif.
THERMODYNAMIC PROPERTIES OF ARGON,
by Eric Baum and G. L. Cann. Aug 63, 66p.
Contract AF33 657 7940, Proj. 7116, Task 7116 03
ARL 63 133 Unclassified report

Descriptors: (*Argon, Thermodynamics), Enthalpy, Entropy, Specific heat, Tables, Data.

The thermodynamic properties of high temperature

argon are calculated. The composition, composition derivatives, compressibility, enthalpy, entropy, equilibrium and frozen heat capacity, gamma and speed of sound, are calculated over the temperature range 1,000-25,000 K and pressure range 0.0001-100 atm. A Mollier diagram is enclosed. (Author)

AD-419 106 Div. 4, 25
OTS price $1.60

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
SOME NEW X-RAY AND NEUTRON STUDIES OF HYDROGEN BONDING,
by Ray Pepinsky. 6 July 57, 4p.
Contract AF18 603 35
Unclassified report

Abstract for International Conference on Current Problems in Crystal Physics, Mass. Inst. of Tech., July 1-6, 1957.

Descriptors: (*Organic compounds, Crystal structure), (*Complex compounds, Crystal structure), Chemical bonds, X-ray diffraction analysis, Neutron diffraction analysis, Stereochemistry, Hydrogen.

AD-419 173 Div. 4
OTS price $2.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
(No title).
Technical rept. no. 9, 1 Sep 62-28 Feb 63.
28 Feb 63, 19p.
Contract Nonr269300, Proj. NR356 407
Unclassified report

Descriptors: (*Viscosity, Polymers), (*Molecular structure, Polymers), Styrene plastics, Melting, Preparation, Molecular weights, Chlorination, Hydrocarbons, Synthesis (Chemistry).

Methods for making monodisperse polystyrenes of molecular weight of 1000 or lower have been developed. Methods for introducing a chloromethyl group on the aromatic ring of a predetermined fraction of the styrene units in a polystyrene chain, with negligible crosslinking, have been developed. (Author)

AD-419 180 Div. 4, 25
OTS price $1.10

X-ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
CRYSTAL-STRUCTURAL MECHANISM OF THE FERROELECTRIC BEHAVIOR OF (GLYCINE)3 x H2SO4,
by Ray Pepinsky. 27 May 61, 3p.
Contract AF18 603 35
Unclassified report

Abstract for International Crystallographic Convention, Leningrad, U. S. S. R., May 21-27, 1959.

Descriptors: (*Organic compounds, Ferroelectric crystals), (*Ferroelectric crystals, Crystal structure), (*Amino acids, Ferroelectric crystals), Ferroelectricity, X-ray diffraction analysis, Stereochemistry, Sulfuric acid, Salts, Abstracts.

AD-419 221 Div. 4, 14, 30
OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
NEW THERMOGRAVIMETRIC RELATIONSHIPS FOR STUDYING THE PYROLYSIS OF POLYMERS,
by Hugh C. Anderson. 8 July 63, 6p.
NOL TR63 113 Unclassified report

Descriptors: (*Polymers, Pyrolysis), (*Pyrolysis, Gravimetric analysis), Heat, Copolymerization, Polyethylene plastics, Weight, Thermochemistry.

Two thermogravimetric methods were developed to show whether rate of weight loss varies with extent of pyrolysis of a polymer. The first of these, a kinetic technique, involves obtaining (at various degrees of degradation) the activation energy, the order of decomposition, and the Arrhenius pre-exponential factor by solving three simultaneous equations. The data for these equations are obtained by performing three thermogravimetric experiments at three constant heating rates. The second method, which involves cycling the polymer between 25 C and a fixed higher temperature, is based on the compound interest law. If the rate of weight loss changes with extent of decomposition, the experimental points deviate from the theoretical curve; if the rate does not vary, the experimental points coincide with the curve. Both techniques show that rate of weight loss does not change appreciably with degree of pyrolysis of Teflon. For a copolymer of tetrafluoroethylene and hexafluoropropylene, these methods show that rate of weight loss does vary with degree of pyrolysis. (Author)

AD-419 223 Div. 4
OTS price $1.10

Uppsala U. (Sweden).
RESEARCH ON REACTIONS BETWEEN EXCITED MOLECULES AND MOLECULAR FRAGMENTS.
Annual summary rept. no. 3, 1 Mar 60-28 Feb 61,
by Stig Claesson. 29 Mar 61, 9p.
Contract AF61 052 70
AFOSR 1319 Unclassified report

Descriptors: (*Photochemistry, Organic compounds), (*Organic compounds, Photochemistry), (*Decomposition, Organic compounds), Reaction kinetics, Chromatographic analysis, Mass spectroscopy, Excitation, Free radicals, Pressure, Vapors, Disproportionation, Carbonyl group.

AD-419 230 Div. 4
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PERFORMANCE OF POROUS ELECTRODES IN A DIFFUSION CONDITION OF FEEDING REAGENTS,
by I. G. Gurevich and V. S. Bagotskiy.
22 July 63, 13p.
FTD TT 63 722 Unclassified report

Trans. from Inzhenerno-Fizicheskiy Zhurnal, 6:2, pp. 60-68, 1963.

Descriptors: (*Electrodes, Porous materials), (*Electrochemistry, Electrodes), Porosity, Performance (Engineering), Diffusion, Electrolytic cells, Equations, Polarization.

Under consideration is a problem concerning the distribution of the electrochemical process by the depth of a porous electrode of finite thickness functioning in a diffusion condition with consideration of electrotechnical polarization and ohmic losses. Given is a general solution in closed form. (Author)

AD-419 298 Div. 4
OTS price $3.60

Research and Development Labs., Magna Corp., Anaheim, Calif.
BIOCHEMICAL FUEL CELLS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63, by J. M. Brake and W. R. Momyer. 31 Mar 63, 1v.
Contract DA36 039sc90866, Proj. 3A99 09 001 01
Unclassified report

Descriptors: (*Fuel cells, Biochemistry), Catalysts, Biophysics, Energy conversion, Clostridium, Models (Simulations), Electrochemistry, Microorganisms, Bacillaceae.

Studies on the electrochemical behavior of two products, ammonia and hydrogen, of potentially useful biochemical reactions are reported. The anodic behavior of hydrogen and ammonia under conditions compatible with biological systems are reported. Various catalysts were studied and the optimum catalyst and conditions for electrooxidation compatible with the biological system selected. Polarization characteristics of the B. pasteurii-urea and Cl. butyricum-glucose systems under conditions where the biological phase was physically confined at the electron carrier surface were obtained. Limiting current densities of 3 mA/cm2 and open circuit potentials of -0.23 V vs SCE were obtained for the B. pasteurii-urea system. The performance of the Cl.butyricum-glucose electrode system was inhibited. Evidence is presented to indicate that the inhibition is probably due to carbon black absorbing the hydrogen produced by the Cl. butyricum. (Author)

AD-419 325 Div. 4, 30
OTS price $1.00

Watervliet Arsenal, N. Y.
A DUAL CELL PLATING APPARATUS FOR DEPOSITION OF MULTI-LAYER METAL SYSTEMS,
by V. P. Greco. June 63, 33p.
Proj. 1F5 23801A289 02
WVT ID6308 Unclassified report

Descriptors: (*Electroplating, Electrolytic cells), (*Metal films, Electroplating), (*Electrolytic cells, Electroplating), Nickel, Copper, Iron, X-ray diffraction analysis, Diffusion, Electrochemistry, Cathodes (Electrolytic cell), Thickness, Hardness, Microstructure, Photomicrography, Chromium, Electroplating solutions.

An experimental dual cell apparatus for the electrodeposition of alternating metal layers (binary systems) employing a rotating cathode is described. Microstructures of multi-layered systems of Ni-Cu and Ni-Fe are shown and some of their properties are discussed and evaluated. X-ray diffraction data on the behavior of the Ni-Cu systems are given. Also shown is the multilayered Ni-Cr microstructure. (Author)

AD-419 390 Div. 4
OTS price $8.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
AN INVESTIGATION OF ORGANOSILAZANES BY BROAD-LINE NUCLEAR MAGNETIC RESONANCE,
by James R. Barrante. Aug 63, 90p.
Contract Nonr186613
Unclassified report

Descriptors: (*Silicone plastics, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Silicone plastics), Organic nitrogen compounds, Metalorganic compounds, Perturbation theory, Equations, Moments, Integral equations, Test equipment, Circuits, Temperature, Rubber.

This report represents the last of a series on the applications of broad-line NMR to problems of inorganic chemistry, and especially to the explanation of the physical behavior of organometallic polymers such as the silicones. The work began with the construction of an instrument in 1951 by LeClair, and continued through the years with the work of Mulay, Ockman, Randall, Englert, and others. The instrument meanwhile has been revised and improved continually. Since it now has reached a satisfying level of dependability and sensitivity, and since it is not duplicated by any commercially available instrument, a full description with circuit diagrams is included in this report. (Author)

AD-419 435 Div. 4
OTS price $3.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NMR STUDIES OF HYDROGEN BONDING IN HINDERED PHENOLS,
by B. G. Somers and H. S. Gutowsky. 13 May 63, 34p. Technical rept. no. 64
Contract Nonr183413, Proj. NR051215
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Organic compounds), (*Organic compounds, Nuclear magnetic resonance), (*Chemical bonds, Hydrogen), Organic solvents, Alcohols, Polymerization, Complex compounds, Molecular association, Reaction kinetics, Temperature, Solutions, Mixtures, Phenols.

Hydrogen bonding of the hindered phenols, 2-isopropylphenol, 2,6-diisopropylphenol, 2-t-butylphenol, 2-methyl-6-t-butylphenol, and 2,6-di-t-butylphenol, has been studied by observing the chemical shifts of -OH group protons. Room temperature dilution shifts in carbon tetrachloride of the phenolic -OH gives dimerization constants K of 1.7, 1.3, 1.0, $\leq$0.05, and $\leq$0.05, respectively, for the five phenols. Association constants for phenoldioxane complexes were obtained from the phenolic -OH dilution shifts in 1,4-dioxane, employing general algebraic expressions derived for the purpose. The association constants are in the same sequence as the K's but about tenfold larger. Observations of both the ethanolic and the phenolic -OH dilution shifts in ethanol-phenol solutions gave similar results, which were limited to a qualitative interpretation by the relatively strong polymerization of the ethanol. (Author)

AD-419 436 Div. 4
OTS price $1.10

Illinois U., Urbana.
NMR IDENTIFICATION OF SUBSTITUTIONAL ISOMERS IN CHELATED POLYCYCLIC AROMATIC SYSTEMS,
by A. L. Porte and H. S. Gutowsky. 1 June 63, 6p. Technical rept. no. 65
Contract Nonr183413, Task NR051 215
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Molecular isomerism), (*Molecular isomerism, Nuclear magnetic resonance), (*Organic compounds, Molecular isomerism), Metalorganic compounds, Molecular structure, Polycyclic compounds, Aromatic compounds.

Magnetic resonance methods may be useful in distinguishing between isomers of phenols with chelating substituents. Two methods by which isomers may be distinguished on the basis of their high-resolution proton magnetic resonance spectra are: (1) From the -OH proton chemical shift. In aromatic systems, the shift of a chelated -OH proton relative to the -OH peak in the corresponding parent phenol is quite large. We have found that this chemical shift is a linear function of the bond order of two bonds $_1C = {}_2C$, with the slope depending somewhat upon the substituent. If the shift is measured, then that part of the aromatic nucleus spanned by the chelated structure can be identified. (2) From the chemical shift of protons. A large part of the chemical shift of a proton, which is situated near an aromatic system, arises from the pi-electronic ring currents induced in the aromatic system when the molecule is placed in a magnetic field. It is this effect which leads to the other method of assigning the substituent position in polynuclear aromatic systems. (Author)

AD-419 526 Div. 4
OTS price $4.60

George Washington Carver Foundation, Tuskegee Inst., Ala.
ALPHA-FLUOROALKYL THIOETHERS.
Final rept.,
by Clarence T. Mason. Mar 62, 43p.
Contract AF49 638 283
AFOSR 2398 Unclassified report

Descriptors: (*Organic compounds, Organic sulfur compounds), (*Sulfur compounds, Organic sulfur compounds), (*Fluorides, Organic sulfur compounds), Synthesis (Chemistry), Ethers, Organic sulfur compounds, Chlorides, Exchange reactions, Chemical properties, Oxidation, Hydrolysis, Stability, Chlorination, Sulfides, Reaction kinetics.

Fundamental research on halogenated thioethers (sulfides) is reported. The primary idea of the research is to investigate the properties of new fluoromethyl thioethers and to compare their properties with those of the chlorine analogues. A series of so far unreported fluoromethyl n-alkyl sulfides was prepared from the corresponding chloromethyl alkyl sulfides. Their chemical properties are discussed. (Author)

AD-419 566 Div. 4, 25
OTS price $2.60

North Carolina U., Chapel Hill.
A MOLECULAR ORBITAL TREATMENT OF THE SPECTRUM OF (TiF6)3-,
by Helen D. Bedon, Sally M. Horner and S. Y. Tyree, Jr. 1 Sep 63, 22p. Technical rept. no. 12
Contract Nonr85505, Proj. NR052 371
Unclassified report

Descriptors: (*Titanium compounds, Atomic orbitals), (*Complex compounds, Atomic orbitals), Ammonium compounds, Fluorides, Sodium compounds, Potassium compounds, Ions, Absorption spectrum, Chemical bonds, Magnetic properties.

Electronic energy levels for the d-1 complex (TiF6)(3-) have been calculated using a molecular orbital scheme, assuming ideal octahedral coordination, taking into account pi-bonding, but not considering ligand-ligand interactions. The inclusion of pi-bonding is shown to be most important when the calculated energy levels are compared with the observed spectra of compounds containing the complex. The observed spectra of (NH4)3TiF6, Na2KTiF6, and NaK2TiF6 show two bands at 15-16,000 and at 18,900 reciprocal cm. The value of 17,500 reciprocal cm for 10 Dq obtained from the calculated energy levels compares very favorably with the observed spectra, the splitting being attributed primarily to Jahn-Teller distortion of the excited state. (Author)

AD-419 578 Div. 4, 25
OTS price $2.60

Princeton U., N. J.
INTERMOLECULAR POTENTIAL IN SOLID METHANE II. COHESIVE ENERGY, CRYSTAL STRUCTURE, AND PHASE TRANSITION,
by S. Kimel, A. Ron and D. F. Hornig. June 63, 20p. TR16
Contract Nonr185827, Proj. NR014 203
Unclassified report

Descriptors: (*Organic compounds, Hydrocarbons), (*Hydrocarbons, Physical properties), Crystal structure, Phase studies, Molecular properties, Solidified gases, Chemical bonds.

The cohesive energy of crystalline methane is calculated for various possible structures, using a potential function consisting of repulsive and attractive interactions between non-bonded atoms. The necessary parameters were taken without adjustment from independent studies of other systems. It was found that the structures D sub 2d have the best packing. It is proposed that the lambde-type phase transition in methane at 20.4 K may be associated with a tetragonal distortion of the f.c.c. unit cell with no change in volume, since the calculated cohesive energy of methane is thereby increased. (Author)

AD-419 581 Div. 4, 25
OTS price $1.10

Oregon State U., Corvallis.
RADIATION-COLORING OF ALKALI HALIDE CRYSTALS CONTAINING SULFATE IONS.
Annual summary rept., 1 Dec 61-30 Nov 62,
by Allen B. Scott. 30 Nov 62, 7p.
Contract Nonr128605, Proj. NR018 701
Unclassified report

Report on A Magnetic Study of Color Centers in Alkali Halides.

Descriptors: (*Color centers, Halides), (*Alkali metal compounds, Halides), (*Single crystals, Color centers), Sulfates, Impurities, Ions, X rays, Solubility, Potassium compounds, Barium compounds, Chlorides, Bromides, Absorption, Optical phenomena.

AD-419 618 Div. 4
OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
MICROWAVE INDUCED DISSOCIATION OF N-HEXANE,
by Arthur D. Coates. Nov 62, 37p.
DA Proj. 512 10 001
BRL Rept. no. 1181 Unclassified report

Descriptors: (*Organic compounds, Dissociation), Alkanes, Microwaves, Infrared spectroscopy, Chromatographic analysis, Mass spectroscopy, Free radicals.

Normal-hexane was dissociated by a 2450 mc microwave discharge maintained at one torr ambient pressure in a flow system. The products were collected in liquid helium and nitrogen-cooled traps, and were identified and determined quantitatively by gas chromatographic and spectroscopic methods. Twenty-five individual components were detected in the product mixture. Dissociation of the n-hexane results primarily from electron-molecular collisions, and from thermal reactions in the discharge zone. The type of dissociation products formed from the hexane suggest that free radical reactions assume an important role in the dissociation and product formation reactions. The relatively large number of branched products in the C6-C8 category are attributed to the large concentration of isobutene and to the presence and stability of the isobutyl radical in the dissociation zone. The results indicate that the dissociation product distribution is independent of microwave input energy over the range of 25 to 125 watts at 2450 mc. An amber solid was formed in the reaction zone during the n-hexane dissociation and studied in KBr by IR spectroscopy. Thermal decomposition of the amber solid was conducted in vacuum and the decomposition products were analyzed. (Author)

AD-419 643 Div. 4, 14
OTS price $2.60

Army Missile Command Redstone Arsenal, Huntsville, Ala.
KINETICS OF EPOXIDE-CARBOXYLIC ACID REACTION, by Robert E. Odom. 26 Aug 63, 18p.
Proj. 517 06 002
AMC RA Rept. no. RK TR63 20
Unclassified report

Descriptors: (*Organic compounds, Reaction kinetics), (*Epoxy plastics, Chemical reactions), Solid rocket propellant binders, Temperature, Heat of activation, Carboxylic acids, O-Heterocyclic compounds, Condensation reactions.

The kinetics of the addition reactions of four structurally different epoxide compounds with glacial acetic acid in dioxane solution have been studied at 90, 110, and 125 C. The relative order of reactivity of the epoxides is styrene oxide > vinyl cyclohexane monoxide > allyl 9, 10-epoxy stearate > 1,2-epoxy-3-phenoxy propane. The reactions apparently follow the first-order-rate law with respect to epoxide and acid concentrations. For the four epoxides whose rates were determined, log10k was found to increase linearly with 1/T according to the Arrhenius equation. (Author)

5. COMMUNICATIONS

AD-419 226 Div. 5, 30
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE COMBINED USE OF PULSE ATTRIBUTES IN PROTECTED CIRCULAR SIGNALS,
by Yu. Tomfel'd. 19 Aug 63, 25p.
FTD TT63 528 Unclassified report

Trans. from Promyshlennaya Telemekhanika, Izdatel'stvo Akademii Nauk SSSR, Moskva, pp. 115-129, 1960.

Descriptors: (*Data transmission system, Coding), Distortion, Signals, Mathematical analysis, Relays, Errors, Remote control systems, Communication equipment.

The combined use of pulse attributes in protected circular signals was investigated. To transmit information concerning the state of M two-position objects in one signal (i.e., for circular transmission in a group), it is necessary to have 2(M) signals, each of which corresponds to one of the combinations of states of the objects of the group. The combined use of pulse attributes is more advantageous than the use of one pulse attribute for circular transmission. Circular transmission may be accomplished with the aid of systematic codes by using a sampling method close to distributional. In the circular method of transmission, protection from distortions may be realized both by the method of protective refusal and through error correction. In the case of two-position objects it is convenient to use signals made up of only complete combination elements. In the case of multi-position objects it is convenient to use incomplete combination elements. (Author)

AD-419 261 Div. 5
OTS price $6.60

Royal Inst. of Tech. (Sweden).
SPEECH ANALYSIS TECHNIQUES.
Technical rept. no. 4 (Final), 1 July 62-30 June 63.
30 June 63, 1v.
Contract DA91 591euc2626
Unclassified report

Descriptors: (*Speech, Spectrum analyzer), (*Speech compression, Effectiveness), (*Voice communication systems, Effectiveness), Bionics, Verbal behavior.

The scientific work accomplished during the contract has concentrated on speech analysis techniques with particular emphasis on instrumentation and methods for automatic extraction of speech signal parameters. There is also a limited amount of work undertaken on synthesis instrumentation and techniques. Of particular interest to speech bandwidth compression techniques is a study of the performance of speech compression systems which were demonstrated at the Stockholm Speech Communication Seminar 1962. (Author)

AD-419 322 Div. 5, 16
OTS price $1.10

American Electronic Labs., Colmar, Pa.
GENERAL BIOPHYSICAL INVESTIGATION AND INSTRUMENTATION. TASK I: TEMPERATURE TELEMETRY SYSTEM FOR LABORATORY ANIMALS. TASK V: USE OF OXYGEN ELECTRODES FOR IN VIVO MEASUREMENT OF ELEVATED OXYGEN PARTIAL PRESSURES.
Final rept.,
by Alvin Singer, Charles Reinhardt and Randal H. Thomas. Sep 63, 5p.
Contract Nonr291200
Unclassified report

Descriptors: (*Telemeter systems, Temperature), (*Oxygen, Measurement), (*Electrodes, Oxygen), Feasibility studies, Animals, Pressure, Measurement, Instrumentation, Laboratory animals.

AD-419 352 Div. 5
OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
IMPROVED UTILIZATION OF TELEMETRY CAPACITY.
Summary rept., 1962-1963,
by C. F. Asquit. 17 June 63, 21p.
AMC RA Rept. no. RG TR63 17
Unclassified report

Descriptors: (*Telemeter systems, Bandwidth), (*Communication theory, Telemetering transmitters), Radiofrequency filters, Electronic commutators, Errors, Circuits, Samplers, Army research.

This report is a summary of work done during the fiscal year 1962-1963 on methods of improving utilization of missile telemetry capacity. The work is divided into two areas: data bandwidth reduction and transmitter bandwidth utilization. Some of the projects have not been completed and work is being continued. Separate reports have been prepared on the completed project. (Author)

AD-419 382 Div. 5, 13
OTS price $4.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). FACILITIES DESIGN CRITERIA STRATEGIC MISSILE SUPPORT BASE, VANDENBERG AIR FORCE BASE,
by G. W. Greene. 20 Sep 63, 1v. Rept. no. MPO SR17 3 402
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Military requirements), (*Launching sites, Electronic equipment), (*Fortifications, Guided missiles (Surface to surface)), Site selection, Roads, Mechanical engineering, Electrical equipment, Power equipment, Lighting equipment, Ground (Electrical), Maintenance, Buildings.

This document in its final form will provide all necessary facilities criteria related to the Ground Electronics System (GES) requirements of the WS-133B Minuteman Weapon System, to accomplish the design of the SMSB for Vandenberg Air Force Base. Information to be provided for each facility will include area requirements, personnel requirements, environmental conditions, special architectural requirements, power, and other service requirements, interfaces, hold down requirements etc. (Author)

AD-419 483 Div. 5
OTS price $8.10

General Dynamics/Electronics, Rochester, N. Y.
DEFT WIRE-LINE STUDY.
Final rept.

Sep 63, 76p.
Contract AF30 602 2911, Proj. 4519, Task 451903
RADC TDR63 358 Unclassified report

Descriptors: (*Telephone communications systems, Data transmission systems), (*Data transmission systems, Telephone communications systems), Digital systems, Coding, Performance (Engineering), Tests, Errors, Stability, Bandwidth, Intelligibility, Destortion, Frequency shift.

The program had to two-fold purpose: consideration of methods for adapting DEFT, a high-capacity communications system for use on the telephone network, and determination of the performance of an experimental DEFT modem over a leased long-distance telephone circuit. A study of the characteristics of the telephone network as they affect data transmission was made. Based on this information, design criteria for a high-capacity system (7000 bits per second, or more) were established. Performance data was accumulated for 125 hours of testing of a single channel capable of handling 50 bits/second in a 20 cps band. A K-carrier loop was used as the transmission medium. Testing was done at five widely separated locations in the audio channel. The unused portion of the channel was filled with noise to simulate a complete system. The average bit error rate (BER) was found to be about 3 in 10 to the 6th power. (Author)

AD-419 584 Div. 5
OTS price $1.60

Radiation, Inc., Melbourne, Fla.
REPEATER, TELEGRAPH TH-38 ( )/G.
Quarterly progress rept. no. 4, 1 Dec 62-1 Mar 63,
by R. D. Squires. 1 Mar 63, 14p.
Contract DA36 039sc87254, Proj. 3B21 06 001 03
Unclassified report

Descriptors: (*Telegraph equipment, Production), Electrical properties, Tests, Vibration, Performance (Engineering), Mechanical properties, Power supplies, Starting, Inverters.

The first two engineering test models were assembled and successfully tested electrically to the Test and Evaluation Plan. Vibration testing was performed, and unit resonance at approximately 35 cycles was detected. A mechanical redesign was begun in order to insure compliance with the mechanical requirements of SCL-4067. (Author)

AD-419 651 Div. 5
OTS price $3.60

Radiation, Inc., Melbourne, Fla.
REPEATER, TELEGRAPH TH-38 ()/G.
Quarterly progress rept. no. 5, 1 Apr-30 June 63.
June 63, 27p.
Contract DA36 039sc87254, Proj. 3B21 06 001 03
Unclassified report

Descriptors: (*Telegraph equipment, Production), Tests, Impact shock, Vibration, Containers, Radiofrequency interference, Filters (Electromagnetic wave), Distortion.

The last Quarterly Report indicated that the first models built failed to pass vibration requirements per SCL-4067. Further testing in this quarter indicated that the shock mounting provisions were not adequate and that the unit did not meet MIL-I-11748 RFI requirements. The unit was completely redesigned, therefore, to insure compliance with the requirements of SCL-4067. Two units were fabricated in this period. The redesigned units passed shock and vibration tests; but, will require some additional effort on the next quarter to fully meet MIL-I-11748 RFI requirements. (Author)

AD-419 690 Div. 5
OTS price $.75

Harry Diamond Labs., Washington, D. C.
A MINIATURE TUNABLE SHORT-WAVE RECEIVER,
by Edwin H. Harrison, Jr. and George R. Yetter.
14 Aug 63, 29p.
HDL Proj. 96300
HDL TR1160 Unclassified report

Descriptors: (*Radio receivers, Miniature electronic equipment), Circuits, Linear systems, Electrodeposition, Resistors, Microminiaturization (Electronics), Intermediate frequency, Transformers, Sensitivity, Power, Antennas, Capacitors, Intermediate frequency amplifiers, Manufacturing methods.

Several miniature tunable short-wave receivers were designed, built, and evaluated, using two types of fabrication techniques. One type used chemically deposited resistors and conductors, with the remainder of the components placed in holes in the glass substrate; the other type used all miniature components mounted on an etched circuit board. Both receiver types have a volume less than 0.5 cu.in. Novel features include a newly developed shielded, dual-section, miniature, variable tuning capacitor and miniature pretuned, toroidal, IF transformers. The receiver has a sensitivity of about 1 microvolt and a power consumption of 12 mw. The tuning range extends from 12 to 18 Mc. (Author)

6. DETECTION

AD-419 091 Div. 6, 30
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington
COMPUTER PROGRAMS FOR PROCESSING SIGNALS RECEIVED IN RADAR ASTRONOMY EXPERIMENTS,
by P. L. Fleck, Jr. and T. J. Goblick, Jr. 16 Aug 63, 28p. Rept. no. 64G4
Contract AF19 628 500
Unclassified report

Descriptors: (*Radar signals, Data processing systems), (*Venus, Radar signals), Programming (Computers), Programming languaged, Signal-to-noise ratio, Radar echo areas, Radio astronomy.

Section II of this report describes the basic Venus radar experiment. Section III deals with the data processing one should perform to maximize the signal-to-noise ratio of received radar echoes assuming the planet is slowly fluctuating point target and the interference is additive gaussian noise. Section IV discusses how these operations are carried out by the computer. Section V gives a detailed list of the program parameters along with their use and format on input data cards, magnetic tape unit usage, and FORTRAN stops built into the program. (Author)

AD-419 142 Div. 6, 1, 33
OTS price $10.50

Federal Aviation Agency, Washington, D. C.
RADAR QUALITY CONTROL FEASIBILITY EXPERIMENT.
Final rept.
Jan 63, 1v.
Proj. 531 1S
Unclassified report

Descriptors: (*Air traffic control systems, Plan position indicators), (*Plan position indicators, Air traffic control systems), Search radar, Quality control, Flight testing, Feasibility studies, Radar echo areas, Radar scanning, Air traffic acceptability, Calibration, Radar equipment, Ground-controlled approach radar.

The objective of this effort was to determine, by a relatively short experiment, the feasibility of utilizing user aircraft for the purpose of continuously monitoring the performance of primary radar systems. The experiment was designed to permit a technical and economic comparison between the user aircraft method of monitoring and the present periodic flight inspections. An analysis of the data collected indicated that it is both technically and economically feasible to perform radar flight inspection by utilizing user aircraft. It is estimated that approximately the same information presently being collected by periodic flight inspection could be collected with user aircraft for approximately one-fourth to one-third of the cost. Conversely, for the same cost as the present periodic flight inspection, approximately three to four times the information could be obtained by making use of the user aircraft technique. In addition, since the user data would be collected on a daily basis, degraded performance would be recognized earlier. (Author)

AD-419 332 Div. 6, 32
OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE USE OF RADAR FOR MONITORING INTERNATIONAL AGREEMENTS ON MISSILE AND SPACE FLIGHTS,
by D. G. Brennan, D. E. Dustin and H. G. Weiss.
27 Apr 60, 62p. 3660046
Contract AF19 604 5200
Unclassified report

Descriptors: (*Disarmament, Space surveillance systems), (*Radar, Disarmament), (*Detection, Disarmament), (*Space surveillance systems, Disarmament), Political science, Guided missiles (Surface-to-surface), Satellites (Artificial), Aerospace craft, Nuclear weapons, Control, Search radar, Radar tracking, Orbital trajectories, Costs, Bombardment satellites, Spaceborne.

A preliminary guide to the use of radar techniques in connection with the inspection of arms-control agreements relating to long-range ballistic missiles, earth satellites and space vehicles is presented. Following a brief introduction, Part 2 discusses the kinds of information that can and cannot be obtained with radar, and provides some indications of evasion possibilities. Part 3 includes a partial survey of contemporary radar technology and capabilities, and rough indications of costs. Part 4 provides very rough guides to system considerations appropriate to three specimen types of agreements: pre-launch registration measures, control of weapons in orbit or outer space, and prohibition of tests of nuclear weapons in space. (Author)

AD-419 468 Div. 6
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A LINEAR-FM RADAR PULSE COMPRESSION SYSTEM EMPLOYING THICKNESS-TAPERED DISPERSIVE DELAY LINES,
by R. C. Yost. 11 July 63, 20p. Technical rept. no. 321
Contract AF19 628 500
Unclassified report

Descriptors: (*Pulse compression, Radar), (*Radar signals, Frequency modulation), (*Delay lines, Tapes), Bandwidth, Photographs, Radar pulses, Sensitivity, Radar receivers, Doppler effect, Signal-to-noise ratio, Impedance matching, Radiofrequency filters.

A radar pulse compression system that employs a linear-FM signal is described. At the option of the operator, the shape of the signal envelope can be made rectangular, Butterworth, or Gaussian. Ultrasonic dispersive delay lines that are thickness-tapered to provide a linear group time delay characteristic over a frequency band of 2 Mcps are used as the signal expansion and compression devices. Included are the test results of the completed unit with photographs of the waveforms. For the poorest case, the time sidelobes in the receiver output waveform are shown to be 35 db below the peak response. The receiver for the rectangular signal and the receiver for the Butterworth signal are mismatched with accompanying losses in the radar sensitivity of 1.7 db and 0.7 db respectively. An uncompensated Doppler frequency shift of one kilocycle per second will produce an error of 7 feet in the estimate of the range to an echoing object. (Author)

AD-419 471 Div. 6, 8
OTS price $14.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PHASED ARRAY RADAR STUDIES.
Rept. no. 1, 1 July 61-1 Jan 63,
by J. L. Allen, D. M. Bernella, W. W. Carpenter, W. P. Delaney and J. DiBartolo. 20 Feb 63, 211p. Technical rept. no. 299
Contract AF19 628 500
Unclassified report

Descriptors: (*Radar antennas, Performance (Engineering)), Radar transmitters, Radar receivers, Phase shifters, Resolution, Tunnel diodes, Ferrites, Limiters, Parametric amplifiers, Test equipment.

The project effort is directed toward investigation of components, techniques and the fundamental theoretical limitations of arrays for high-power high-resolution radar applications. The range of components investigated includes low-noise RF amplifiers, stable IF amplifiers, high-power modularized transmitters, high-speed microwave switches and several types of digital microwave phase shifters. Basic limitations to the power-handling capabilities of semiconductor diodes and strip transmission lines are being investigated. Specialized test equipment has been assembled to aid in components investigations. Techniques work continues in the area of synthesis and use of low-loss passive simultaneous multiple beam-forming systems. A modular electronically steered transmitter has been added to the 16-element linear test array to replace the original fixed broad-beam illuminator, and a receiving system using simultaneous beam-forming techniques is under construction. Studies of the fundamentals of arrays include consolidation of the mutual coupling theory and studies of the effects of such coupling on unequally spaced arrays. The relationship between transmitter efficiency and transmitted pulsewidth is examined and expressions are derived for minimizing the cost of certain array systems when the per-element costs are known. (Author)

AD-419 591 Div. 6
OTS price $2.60

Pacific Missile Range, Point Mugu, Calif.
RANDOM ERROR IN ESTIMATING SUBMARINE POSITION BY

USING ONLY SOUNDINGS FROM THREE FIXED HYDROPHONES, by M. L. Eaton and K. P. Weller. 25 Sep 63, 20p.
PMR TM63 11 Unclassified report

Descriptors: (*Target position indicators, Submarines), (*Position finding, Hydrophones), Errors, Statistical functions, Statistical analysis, Armed forces research.

Three hydrophones are assumed to be located exactly at the corners of a known equilateral triangle on a level ocean floor. The three sonically measured distances from a submarine to these hydrophone stations are used to comput the position of the submarine. Each of these three measurements is subject to a random error, which, in consequence, causes an error in the computed location of the submarine. This report derives methods for computing the amount of imprecision in the resulting estimate of the submarine's position. These methods were programmed for machine computation, and some of the results of the computations are shown in tables and contour maps. It is noted that, throughout large regions, precision improves considerably as the submarine moves from a height of 1/20 of the baseline length to a height of 1/5 this length. Finally, tables (from an earlier report) for a similar system, which uses an accurate depth (pressure) sensor in the submarine, are included for the reader's comparison. The addition of the depth sensor improves precision considerably. The substitution of the depth sensor for one hydrophone either decreases or increases precision, depending upon the location of the submarine relative to the two remaining hydrophones. (Author)

7. ELECTRICAL EQUIPMENT

AD-419 023 Div. 7
OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL AND THEORETICAL STUDY OF THE WALL-STABILIZED, TRANSPIRATION-COOLED DC ELECTRIC ARC,
by Michael F. Baran. Aug 63, 120p.
AFIT GNE PHYS 63 2 Unclassified report

Descriptors: (*Electric arcs, Design), Plasma medium, Argon, Electric currents, Electric potential, Anodes, Cathodes, Cooling, Enthalpy, Programming (Computers).

A wall-stabilized, transpiration-cooled arc device was built which consisted of a cathode chamber containing a 0.25-in. diameter tungsten cathode, 12 half-inch thick wall segments containing porous graphite segments through which argon at about 1.1 atm was injected into the 0.25-in. diameter arc channel, and a hollow, cylindrical water-cooled copper anode which served as the plasma exhaust. Cooling water to the cathode, the wall sections, and the anode provided information concerning the power losses to the device components. The argon flows to the cathode chamber and each wall segment were individually controlled and monitored by specially built coiled capillary flowmeters. The device proved extremely stable, and after 30 hours of operation, electrode wear was not detectable. For arc powers in the range of 8 to 20 kw DC, and mass flows on the order of 22 to 29 lb/hr, gas enthalpies from 600 to 1,400 Btu/lb were obtained at a device efficiency of 50%. (Author)

AD-419 057 Div. 7
OTS price $11.50

Air Force Inst. of Tech., Wright-Patterson Air Force, Base Ohio.
THE ELECTRICAL CHARACTERISTIC OF AN ELECTRO-HYDRODYNAMIC GENERATOR FOR AN ALTERNATING INPUT,
by John Paul Sutherland and John Wilson Storr.
Aug 63, 140p. GA Phys 63 11 12
Unclassified report

Descriptors: (*Generators, Plasma physics), (*Electrostatics, Hydrodynamics), (*Electric power production, Electric fields), Velocity, Air, Electrical corona, Alternating current, Capacitance, Air Force research, Ionization, Theory, Differential equations, Electrical properties.

The electronydrodynamic generator investigated transforms kinetic energy from a high velocity airstream into recoverable electrical energy by transporting corona discharge ions against an electric field. Theoretical and experimental investigations of the electrical characteristics of the generator were conducted for alternating inputs. The feasibility of alternating current power generation was demonstrated, optimum input wave shape and ranges of load resistance and frequency determined, and self-sustained oscillation hypothesized. The output capacitance of the generator proved to be the limiting factor in the experimentation. Further investigation, particularly with a biased alternating input, on a generator designed specifically for alternating current operation is recommended. (Author)

AD-419 076 Div. 7
OTS price $4.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC RESEARCH.
Quarterly progress rept., no. 6
by C. M. Henderson. 28 June 63, 74p.
Contract AF33 657 7387, Proj. 8173
Task no. 817302 9
AEC NP12988 Unclassified report

Descriptors: (*Generators, Thermoelectricity), (*Aero space craft, Power supplies), Thermocouples, Materials, Graphite, Molybdenum, Design, Resistance (Electrical), High temperature research, Thermal conductivity.

The experimental model generator, previously operated for 2556 hr at 1200 C in a vacuum of 10 to the-5th power 10 to the-6th power mm Hg without degradation of power output, was disassembled and examined. No physical change or damage to its MCC 50-graphite thermoelements was found. Formulations of new p- and n-type thermoelectric materials, to supplement MCC 50, were standardized and techniques developed for forming them into segmented thermoelements. Realistic measurements of segmented p- and n-type thermoelements showed that efficiences ranging from about 3% for p-type to about 6% for n-type can be attained for such units when operating between about 1200 C and about 460 C. (Author)

AD-419 250 Div. 7, 26
OTS price $2.60

General Electric Co., West Lynn, Mass.
RESEARCH AND DEVELOPMENT OF MATERIALS AND FABRICATION TECHNIQUES FOR THERMOELECTRIC POWER GENERATION.
Quarterly progress rept. no. 5, 1 Jan-15 May 63.
15 Aug 63, 23p.
Contract Nobs86854, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: (*Thermoelectricity, Materials), (*Power supplies, Manufacturing methods), Bonding, Brazing, Tin alloys, Tellurium alloys, Intermetallic compounds, Diffusion, Pressure, Iron, Lead alloys, Resistance (Electrical).

Attention has been focused upon the iron end cap bonding problem. The two techniques outlined in the previous report, namely, isostatic bonding and tin telluride brazing, have been explored in some detail. Results obtained with tin telluride brazing, although not conclusive, show low electrical resistance and the presence of inclusions in the vicinity of the bond. Temperature testing of elements with tin telluride brazed end caps has resulted in fractures in the P type element and in some cases separation from the iron end caps. The isostatic bonding of iron end caps has shown that low resistance joints may be obtained in this manner as measured in several of the specimens. (Author)

AD-419 299 Div. 7
OTS price $1.60

Mallory, P. R. and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 6, 16 Mar-15 June 63,
by R. E. Ralston. 15 June 63, 7p.
Contract AF33 657 7706, Proj. 8173, Task 817304 14
Unclassified report

Descriptors: (*Storage battery, Design), (*Mercury alloys, Storage batteries), Anodes, Cathodes, Voltage regulators, Gold alloys, Measurements, Palladium alloys, X-ray diffraction analysis, Tables, Time, Silver, Porous metals.

A positive electrode material composed of mercury and palladium is under investigation. Preliminary charge acceptance data are encouraging. The voltage regulation during discharge has been excellent. A different approach to negative electrode evaluation is being studied. Two zinc electrodes, one charged and one discharged, with regenerated cellulose separator interposed between the two, are being cycle tested. Only limited data have been obtained, but a continuation of effort is warranted. A capacitance measuring procedure for silver in alkaline electrolyte was established. A capacitance of 70 mfd/cm to the 2nd power was experimentally determined for silver foil. The surface areas obtained when several porous silver electrodes were measured were 1000 cm to the 2nd power/cm to the 3rd power to 1170 cm to the 2nd power/cm to the 3rd power. (Author)

AD-419 301 Div. 7
OTS price $1.60

Mallory, P. R., and Co., Indianapolis, Ind.
CELL EQUALIZATION TECHNIQUES.
Quarterly technical progress rept. no. 3, 1 Apr-1 July 63,
by W. D. Loftus. 1 July 63, 1v.
Contract AF33 657 8749, Proj. 8173, Task 817304 18
Unclassified report

Descriptors: (*Alkaline cells, Voltage regulators), (*Voltage regulators, Alkaline cells), Battery chargers, Diodes (Semiconductors), Nickel, Cadmium, Measurements, Tables, Temperature, Electric potential, Silver, Zinc.

Additional work on the 1.5 volt nickle-cadmium cell stabistor and experimental test results verify the feasibility of equalizing the cells of a series connected group by use of stabistors. Effort was directed toward the design of a 2.0 volt stabistor for use with the silver-zinc couple. Preliminary theoretical and experimental investigations indicate satisfactory operation of the stabistor on the lower voltage plateau; operation on the higher voltage plateau is expected to involve severe losses. The specific voltage of the anti-reversal device has been reduced by about 10% by a different method of junction formation. One experimental charge control circuit has been cycled in excess of 1250 times and a second circuit was cycled 785 times without catastrophic failure of cells or semiconductors. (Author)

AD-419 401 Div. 7
OTS price $11.50

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Final rept., 1 July 62-30 June 63,
by D. J. Doan and L. R. Wood. 30 July 63, 132p.
Rept. no. 12
Contract DA36 039sc89188
Unclassified report

Descriptors: (*Batteries and components, Ammonia), (*Electrolytes, Solvents), Liquefied gases, Design, Electrolytic cells, Battery separators, Cathodes (Electrolytic cells), Feasibility studies, Anodes (Electrolytic cells).

Considerable progress has been made in cell design which has permitted approximately 50% increase in energy density of multicell units. Multicell test methods have been improved resulting in development of definitive information concerning intercell current leakage, activation mechanisms, and general battery design problems. Screening tests have revealed no new cathode materials of any significance for the ammonia system. An improved separator has been found for low-rate, long-duration application. General battery performance, both at high and low ambient temperatures, has been improved. Maximum energy delivery has been 5.6 watt-hours per pound and the minimum activation time to 80% peak load voltage was 0.45 second which denotes the capability of the system. (Author)

AD-419 557 Div. 7
OTS price $3.50

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF AN AUXILIARY ELECTRODE THERMIONIC CONVERTER.
Summary technical rept.,
by W. B. Hall and J. J. O'Grady. May 63, 200p.
Contract AF33 657 8005, Proj. 8173, Task 817305 9
ASD TDR63 442 Unclassified report

Descriptors: (*Thermionic converters, Manufacturing methods), (*Cesium, Thermionic converters), Materials, Design, Electric power production, Electric currents, Electric potential, Molybdenum, Ceramic materials, Temperature, Distribution, Emissivity, Compatibility, Metals, Alloys, Electrodes.

The program covered in this report includes the development of a cylindrical converter which employs an emitter thermally bonded to, but electrically insulated from, a central heat source tubing suitable for liquid metal heating. This converter was designed, fabricated, and tested to a power level in excess of one watt per sq. cm. at an operating temperature of 1200 C with

an efficiency of approximately 5%. Cesium compatibility studies were performed to extend the knowledge of materials useful for the design and fabrication of thermionic converters. Geometry studies were made to determine the best emitter-collector configuration for converter operating at 1200 in the 'Ball-of-Fire' mode. The 'Saw Tooth' configuration of electrodes was developed and demonstrated to give a higher power density than the plain cylindrical geometry on a projected area basis. More consistent and stable converters were fabricated by improving processing and exhaust procedures and by employing materials of higher purity. (Author)

AD-419 608 Div. 7, 8
OTS price $3.60

Cooke Engineering Co., Alexandria, Va.
BURIED CABLE RADIATION STUDY, PHASE I.
Rept. for June-Dec 59,
by Stanley Weintraub, J. L. Lantz and A. A. Carterette. Dec 59, 15p.
Contract NBy17827

Unclassified report

Descriptors: (*Attenuation, Electromagnetic fields), (*Electromagnetic fields, Attenuation), (*Electric cables, Soils), Equations, Permeability (Magnetic), Electrical conductance, Dielectric properties, Thickness, Resonance.

This report covers the period from June 1959 through December 1959. During this period, engineering personnel of Cooke Engineering Company have conducted intensive research into the problems attendant upon suppression of propagation of electromagnetic energy from underground cables by attenuating media. The research has indicated that the parameters which exhibit the greatest effect on the suppression of propagation through attenuating media are permeability, conductivity, dielectric constant, and thickness or depth of the medium. The results of the research have shown that if the parameters of the medium are constant at all frequencies within the range of study, attenuation will increase as the frequency increases. Conclusions made from the calculations and graphs have been prepared for presentation, and a series of experiments to prove these conclusions proposed. The proposed experiments will, in addition, reveal the behavior of variable parameters which could not be predicted from theoretical studies. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-419 014 Div. 8, 28
OTS price $5.60

University of Southern Calif., Los Angeles.
THE PSYCHOLOGICAL DIMENSIONALITY OF BASIC ELECTRONIC CIRCUITS: I. THE STABILITY OF THE SCALING TECHNIQUES,
by Joseph W. Rigney, Robert Fromer and C. Henry DeBow. July 63, 47p. Technical rept. no. 38
Contract Nonr228 22, Proj. NR153 093
Unclassified report

Descriptors: (*Circuits, Electronics), (*Electronics, Circuits), (*Psychology, Circuits), Electronic equipment, Reliability, Analysis, Stability, Design.

This is the first of a series of reports concerned with the use of multidimensional scaling in identifying electronic circuit characteristics which make their functions difficult for electronics technicians to understand. Thirteen basic electronic circuits were analyzed. Scale values for the 78 possible circuit-pairs were derived by the multidimensional method of successive intervals. These were converted to interstimulus distances, which were analyzed for minimum dimensionality by three current methods of multidimensional scaling. Six dimensions were extracted. The first three of these accounted for most of the variance in the interstimulus space. This report presents data on the reliability of these multidimensional procedures. Estimates of reliability were computed for the successive steps in the method; including intrasubject stabilities across replications, distance scale stabilities, and coefficients of congruence for final dimensions across replications, groups, and methods. (Author)

AD-419 032 Div. 8, 30
OTS price $2.60

Shockley Transistor Corp., Mountain View, Calif.
NEW CONCEPTS FOR SOLID STATE MICROWAVE GENERATORS.
Quarterly rept. no. 3, 1 Apri-31 Jun 63,
by R. M. Scarlett. 31 Jun 63, 24p.
Contract DA36 039AMC00001E, Proj. DA3A99 21 001
Unclassified report

Descriptors: (*Diodes (Semiconductor), Microwave frequency), Scientific research, Diffusion, Antimony, Impurities, Aluminum, Coatings, Bonding, Gold, Boron, Phosphorus, Frequency, Negative resistance circuits, Electric currents, Gains.

A new design of transit-time device having minimum unused area is described. The first experimental units showed abnormally high emitter capacitance at low forward bias and low cutoff frequency which is not yet understood. Previous theory of the optimum operating frequency is modified and corrected. New small-area PIN diodes made epitaxially with antimony doping showed a transition time of about 0.5 nsec at a 2.4 ampere extraction current. At this current level, they appear to be limited by carrier storage effects rather than by capacitance. (Author)

AD-419 060 Div. 8
OTS Price $3.60

International Resistance Co., Philadelphia, Pa.
PRECISION VOLUME RESISTOR.
Interim Development rept. no. 1, 18 June-31 Aug 63.
by C. Huang and K. M. Merz. Sep 18, 63 34p.
Contract NObsr89439 Proj. SR008030SUB. TASK 9598
Unclassified report

Descriptors: (*Resistors, Processing), (*Materials, Resistors), Manufacturing methods, Carbon resistors, High temperature research, Vapor plating, Electricial properties, Resistance (electricial), Tests, Aluminum compounds, Oxides, Glass resistors, Palladium, Nickel, Carbides, Ceramic materials, Borides.

Efforts concern an investigaton.of materials and fabrication techniques capable of leading to a precision, stable, volume resistor composed of inorganic materials. The high temperature deposition of carbon into a porous ceramic was found to produce resistors with excellent properties. Because of the increase in temperature coefficient of resistance with range, this method is only useful for very low-range resistors. Limited performance tests were completed on these resistors. Differential thermal analysis and thermogravimetric analysis studies were made on materials and materials systems of possible use for resistor fabrication.(Author)

AD-419 114 Div. 8, 26
OTS price $5.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF RELIABILITY CHARACTERISTICS OF SOME COMPLEX NETWORKS,
by James Hurst Stephenson. Aug 63, 49p.
AFIT GRE EE63 4 Unclassified report

Master's thesis

Descriptors: (*Electrical networks, Reliability (Electronics)), (*Reliability (Electronics), Electrical networks), Electric bridges, Probability, Mathematical prediction, Special functions (Mathematics), Reports.

Reliability functions and a procedure are developed by which maximum reliable parallel-series and series-parallel networks may be designed. These networks are composed of equal elements having open and short circuit failure modes. Reliability functions are developed for bridge and lattice networks composed of unequal elements having a single failure mode. These functions are given in two forms, one suitable for substitution into more complex networks and one suitable for desk calculation and computer programming. Reliability functions are developed for two, three, four, and five station polygonal networks composed of equal paths with single failure modes. Reliability improvement is shown as stations are increased. (Author)

AD-419 120 Div. 8, 24
OTS price $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
APPLIED RESEARCH ON SEC AMPLIFICATION CAMERA TUBE.
Final rept. for Dec 62-Jun 63,
by G. W. Goetze, A. H. Boerio and H. Shabanowitz. Sep 63, 27p.
Contract AF33 657 9190
ASD TDR63 840 Unclassified report

Descriptors: (*Camera tubes, Secondary emission), (*Secondary emission, Camera tubes), Electrooptical photography, Photocathodes, Aerial reconnaissance, Cathode ray tube screens, Compatibility, Electron beams.

The design, construction, and evaluation are described of several experimental camera tubes employing the SEC target, stressing the compatibility of SEC targets with photocathodes of the S-20 type. Special problems connected with scanning the SEC target by a low-velocity direct beam are discussed as well, as a solution to the problem of target crossover under overload, the use of an additional screen in front of the reading side of the target. From the experimental data presented, it is concluded that camera tubes of the type described compare favorably in over-all performance with conventional camera tubes using return beam readout, while presenting several practical advantages due to the use of the SEC target. (Author)

AD-419 140 Div. 8
OTS price $14.00

Allison Div., General Motors Corp., Indianapolis, Ind.
INVESTIGATION OF CAPILLARY EMITTER THERMIONIC CONVERTERS.
Rept. for 15 May 51-15 Aug 63,
by D. L. Dresser, J. D. Dunlop, H. Huber, R. LeBihan, and V. L. Hill. Sep 63, 190p.
Contract AF33 616 8299, Proj. 8173, Task 817305 11
ASD TDR63 865 Unclassified report

Report on ''Static Energy Conversion''

Descriptors: (*Thermionic emission, Capillaries), (*Capillaries, Thermionic emission), Ionic current, Energy conversion, Ion sources, Electrons, Cesium, Vapors.

A random current theoretical model is formulated to describe the emission of ions and electrons from a capillary thermionic emitter. Extensive experimental results from monocapillary and multicapillary devices are shown to be in good agreement with the theory. Practical power densities of 5 to 15 watts/square cm were obtained between 1900 and 2100 degrees K. A modified capillary emitter in which no cesium flow is required was also investigated and found to agree with the random current model. Ion current measurements, high frequency oscillations, and spectroscopic data are used to interpret the operating conditions of the capillary emitter. Technology developments are reported on the subjects of emitter fabrication and chemical vapor deposition. (Author)

AD-419 156 Div. 8, 30
OTS price $2.60

Remington Rand Univac Div. Sperry Rand Corp., St. Paul, Minn.
INTEGRATED CIRCUIT STUDY.
Interim Engineering Rept. no. 1, 1 Jun-31 Aug 63. Sep 63, 20p.
Contract NObsr89341
Unclassified report

Descriptors: (*Circuits, Computers), Computer logic, Diodes (Semiconductor), Tests, Subminiature electronic equipment, Transistors, Performance (Engineering).

The progress achieved in the integrated circuit study program for the CP-667 Computer is described. Significant accomplishments were recorded in the following areas: selection of a circuit type and performance testing of existing available integrated circuits. (Author)

AD-419 161 Div. 8
OTS price $2.60

Southwest Research Inst., San Antonio, Tex.
A NONROTATING SPACED LOOP DIRECTION FINDING SYSTEM. INTERIM DEVELOPMENT REPORT FOR DIRECTION FINDER RADIO, SHIPBOARD SITING AND DESIGN, STUDY AND DEVELOPMENT.
Report for 30 June-30 Aug 63,
by W. M. Sherrill and Douglas N. Travers.
30 Aug 63, 24p.
Contract NObsr89167, Proj. SF0010801, Task 9258
Unclassified report

Descriptors: (*Direction finding, Radio equipment), (*Loop antennas, Ship antennas), Shipborne, Sensitivity, Coupled antennas, Coils, Gain, Circuits, Calibration, Test methods.

A description and performance characteristics including bearing accuracy and system sensitivity are given for the laboratory version of a nonrotating spaced loop D/F system. Methods contemplated for optimizing the system, including the use of antenna multicouplers, quadrature hybrids, and voltage variable inductors are discussed. Some AGC, frequency tuning, and channel matching requirements for the application of the twin channel receiver to a D/F intercept system are briefly reviewed. The results of a recent survey of twin channel receivers planned for production are summarized in terms of requirements outlined. It is concluded that the nonrotating spaced loop D/F system is a feasible and desirable system because of the capability for continuous sense and fast response time provided. Second generation twin channel receivers presently planned should offer significant intercept capability for the D/F system. (Author)

AD-419 178 Div. 8
OTS price $3.60

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
INTEGRATED LOGIC NETS,
by S. R. Hofstein and F. P. Heiman. 16 July 63, 31p. SR2
Contract AF19 604 8836, Proj. 4641, Task 464104
AFCRL 63 331 Unclassified report

Descriptors: (*Integrated circuits, Electrical networks), (*Transistors, Theory), Solid state physics, Metal films, Semiconductor devices, Metals, Oxides, Electrical conductance, Space charges, Density, Electrical properties, Inverter circuits, Computer logic, Semiconducting films.

This report describes a device possessing a significant departure from the conventional unipolar transistor in that the reverse-biased p-n junction has been superseded by a metal-oxide-semiconductor (MOS) control structure. A simple model is proposed and the basic transistor current-voltage relationships are derived for a thick oxide and shallow conducting channel. A more detailed model is than proposed to explain some observed anomalies. The usual approximation of constant current in the saturation region is abandoned and the behavior of the drain resistance is considered. Relations predicting and describing this behavior are closely analogous to similar relations for vacuum tubes. Experimental data from units to which this model may be applied have shown close agreement with the theoretical predictions. The yield of units fabricated to date has averaged over 95%, on recently fabricated wafers, indicating great promise for integrated electronics applications. (Author)

AD-419 204 Div. 8
OTS price $2.60

Illinois U. Engineering Experiment Station, Urbana.
IMPEDANCE DATA ON OBLIQUE INCIDENCE ANTENNA LOCATED AT LUBBOCK, TEXAS,
by Fred R. Ore. Sep 63, 24p. Technical note no. 20
Contract Nonr183402, Proj. N371 161
Unclassified report

Descriptors: (*Coupled antennas, Electrical impedance), (*Electrical impedance, Measurement), Antenna configurations, High frequency, Very high frequency, Antenna radiation patterns, Model tests, Antenna components.

The results are given of a series of performance measurements made on an antenna to be used in conjunction with ionospheric sounding equipment. Included are: (1) a brief description of the antenna, (2) the result of impedance measurements made on the full scale structure, and (3) the results of pattern measurements made on scale models of a single element of the array and of the array. (Author)

AD-419 209 Div. 8, 26
OTS price $6.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES 2N559 - 2N1094.
Quarterly progress rept. no. 22, 1 Apr-30 June 63,
by M. N. Reppert. 30 June 63, 57p.
Contract DA36 039SC72729
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Production, Transistors), Degasification, Bonding, Wire, Vapor plating, Vacuum apparatus, Welding, Diffusion, Silicon compounds, Dioxides, Coatings.

Contents: Modification of transistor processing and production equipment, Wire bonding, Handling tray loading, Tinning transistor leads, Slice surface preparation, Stripe evaporation and alloying, Header thermal capability, Wire welding, Material handling, Pneumatic components, Diffusion, Silicon dioxide coating, Header internal lead trimming.

AD-419 213 Div. 8
OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
APPLICABILITY OF TRANSISTORS AS LOW-LEVEL SIGNAL SWITCHES,
by Jimmy W. Rees. 14 Aug 63, 25p.
AMC RA Rept. no. RG TR63 16
Unclassified report

Descriptors: (*Transistors, Commutators), (*Commutators, Telemeter systems), Circuits, Electronic switches.

A detailed summary of the research conducted on solid state circuit techniques is presented. The objectives are fourfold: First, to describe the current requirement in telemetry for a low-level electronic commutator; second, to analyze the behavior of the transistor switching characteristics, namely, the cutoff, active, and saturation regions; third, to consider the low-level characteristics of transistor switching parameters on low-level circuit performance; and finally to present a detailed theoretical analysis of transistor low-level operation leading to a design approach for an acceptable low-level switch. (Author)

AD-419 256 Div. 8
OTS price $1.10

Westinghouse Electric Corp., Baltimore, Md.
3.0-MILLIMETER WAVELENGTH DUPLEXER.
Quarterly progress rept. no. 5, 15 Apr-15 July 63,
by Stafford D. Schreyer. 15 July 63, 9p.
Contract DA36 039SC89223, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Radar duplexers, Extremely high frequency), (*Transmit-receive tubes, Millimeter waves), (*Crystal mixers, Limiters), Waveguide switches, Magnetrons, Test equipment (Electronics).

The work done during the quarter was concerned with operation of the high power test facility. Two magnetrons were received and both had cathode failures after a few hours operation. However, some data on firing power of the TR stage and the keep-alive stage was obtained. Since initial data showed the firing power of the keep-alive stage to be high, several modifications to the keep-alive structure were made. Unfortunately, these could be evaluated only at klystron power level since the magnetron had previously failed. (Author)

AD-419 269 Div. 8, 25
OTS price $5.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 1, 16 Dec 62-15 Mar 63,
by R. Novick. 15 Mar 63, 53p. Rept. no. CU3 63SC90789 Physics
Contract DA36 039sc90789, Proj. NR372 101, DA Task 3A99 20 001 09
Unclassified report

Descriptors: (*Radio astronomy, Masers), (*Solid state physics, Color centers), (*Cryogenics, Semiconductors), Nuclear magnetic resonance, Atomic properties, Atomic energy levels, Magneto-optics effect, Radioactive isotopes, Hyperfine structure, Molecular spectroscopy, Molecular beams, Magnetrons, Ultraviolet filters, Extremely high frequency, Microwaves, Lithium, Lasers.

A detailed study has been made of the metastable lithium atom. The threshold energy production cross section, and lifetime values are in reasonably good agreement with the theoretical calculations. The fine structure splitting of the 3P term of the lithium atom has been determined by level crossing spectroscopy. The observed interval is 2880 Mc/sec and is about 12% smaller than the corresponding splitting. Precise knowledge of fine structure will provide a critical test of three electron wave functions. The spin, magnetic moment and quadrupole moment of Cd(113m) have been determined by optical double resonance. Computational techniques have been developed for the evaluation of fine structure corrections to the level crossing fields in (sp) configurations. A new electric resonance molecular beam apparatus has been constructed and will be used for the study of molecular structure. A new high temperature microwave absorption spectrometer has been constructed and used for the determination of the rotational structure of LiCl. This spectrometer is unique in that it employs a nitrogen buffer gas to reduce the rate of contamination of the microwave windows and Stark plate insulators. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-419 319 Div. 8, 26
OTS price $1.60

Midland Mfg. Co., Inc., Kansas City, Kans.
CR-(XM-44)/U MODERATE PRECISION GLASS ENCLOSED CRYSTAL UNITS.
Quarterly progress rept. no. 2, 1 July-30 Sep 62, by Howard E. Dillon and John G. Deininger.
30 Sep 62, 18p.
Contract DA36 039sc86717
Unclassified report

Descriptors: (*Quartz resonators, Glass seals), (*Crystal holders, Glass seals), Manufacturing methods, Tests, Capacitance, Resistance (Electrical), Electrical properties.

Construction of glass-holder sealing equipment is under way. Tentative quartz resonator designs have been partially evaluated, and appear to be satisfactory. (Author)

AD-419 342 Div. 8, 7, 30
OTS price $3.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
RESEARCH ON LOW-POWER MAGNETIC-FILM MEMORIES.
Interim engineering rept. no. 1, 14 May-14 Aug 63.
Aug 63, 25p.
Contract AF33 657 11199
Unclassified report

Descriptors: (*Thin films, Magnetic core storage), (*Feasibility studies, Circuits), (*Circuits, Synthesis), Coupling circuits, Electroplating, Copper coatings, Electric insulation, Electric wire conductance, Design, Time, Noise, Signals, Capacitance, Amplifiers, Resistors, Capacitors, Circuit testers.

The objective is to demonstrate the feasibility of fabricating microminiaturized evaporated circuitry for use with the low-power magnetic-film memory elements. The layout of a 64-word, 24-bit-per-word memory system, complete with address registers and timing circuits, was completed. This layout is used to ensure the compatibility of individual circuit designs with the system. A word driver, two bit drivers, and a sense amplifier have been designed and breadboard models have been constructed and tested. Word drivers have been evaporated and a driver has been used to operate bits on a 4-by-4 memory array. Bit drivers have been evaporated but not tested. The physical layout of the sense amplifier is being designed. Techniques for the preparation of evaporated resistors have been improved to the extent that resistance tolerance is now ±15%. Large memory arrays of 64 words, 24 bits per word have also been successfully evaporated. Disturb tests have been performed on individual bits. The disturb-current margin on good films is about 100 percent, even after 10,000 disturb pulses are applied. (Author)

AD-419 398 Div. 8, 14, 26
OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 9 for period ending 27 July 63,
by Paul C. Ricard. 27 July 63, 9p.
Contract DA36 039sc85955
Unclassified report

Descriptors: (*Fixed capacitors, Industrial production), (*Industrial production, Fixed capacitors), Ceramic capacitors, Titanates, Fluorination, Barium compounds, High-temperature research, Silicone plastics, Encapsulation, Environmental tests, Dielectrics, Manufacturing methods, Silicates, Zirconium compounds.

Efforts were continued on the establishment of a PEM for flourinated barium titanate capacitors for operation to 200 C. Variations in firing cycles showed little correlation with fluoride susceptibility in the mature ceramic disc. Two silicone resin type formulations were developed for encapsulation of the capacitor. These show great promise for fulfilling the lead strength requirement and are now undergoing environmental testing. Ceramic dielectrics of all pre-production samples were fluorinated and further assembly of the units will take place pending the outcome of test results of new encapsulants. (Author)

AD-419 405 Div. 8, 30
OTS price $3.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
NEW TECHNIQUE FOR MICROWAVE RADIOMETRY,
by M. W. Long and J. C. Butterworth. 3 May 63, 34p. Technical rept. no. 4
Contract Nonr99107, Proj. A390
Unclassified report

Descriptors: (*Radiometers, Extremely high frequency), (*Modulation, Doppler systems), Tuned circuits, Interference, Resistors, Detectors, Power meters.

An interference modulation technique for microwave radiometry is described. Use of the technique is considered for the development of a radiometer for tuning over a wide range of frequencies, a radiometric device for determining the absolute sensitivity of detectors over a wide range of frequencies, and a means for determining the power level of coherent sources as a function of frequency. A device using this technique does not require the use of a coherent source, and the technique is applicable to wavelengths well into the low millimeter region. (Author)

AD-419 406 Div. 8
OTS price $.50

Naval Research Lab., Washington, D. C.
SYNTHESIS OF UNITY-GAIN COMPLEX-ZERO RC NETWORKS,
by Charles F. White. 12 Aug 63, 14p.
NRL 5972 Unclassified report

Descriptors: (*Electrical networks, Synthesis), (*Resistors, Capacitors), Complex variables, Electric filters, Mathematical analysis.

Resistance-capacitance networks provide filtering insertion loss variation with frequency. For prescribed voltage transfer functions containing complex zeros and negative-real poles, known synthesis procedures lead to RC networks exhibiting an undesirable frequency-independent loss. A new network synthesis procedure is set forth and applied to obtain: (a) four 7-element RC networks exhibiting damped complex zeros and (b) a 6-element RC network with undamped complex zeros of transmission. When these new networks are applicable, the prescribed transfer function is realized exactly, including the unity multiplicative constant. In addition, these networks have fewer elements than previous realizations. (Author)

AD-419 424 Div. 8, 26
OTS price $2.60

Bomac Labs., Inc., Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 6, 6 Nov 62-6 Feb 63.
by Gary G. Riska. 6 Feb 63, 24p.
Contract DA36 039sc85974
Unclassified report

Descriptors: (*Magnetrons, Production), Extremely high frequency, Anodes (Electron tubes), Tuning devices, Grinders, Humidity, Temperature, Machining, Electron tube parts, Corrosion, Metal coatings, Gold, Nickel, Oscillation, High temperature research, Life expectancy.

The following work was done during this quarterly period: (a) Evaluation of a second lot of magnetrons made with anodes hobbed and machined; (b) Attainment of adequate frequency control on manufactured anodes; (c) Manufacture of a second hob using the hob grinder and associated facilities; (d) The investigation of tunability was completed with the conclusion that considerable development would be required to make it usable; (e) The humidity-temperature investigation was completed with the conclusion that the tube processing to be used will provide storage and use protection up to 100 F and 100% humidity environment; and (f) The testing problem, which has been related to the high repetition frequency oscillation, has been resolved by modification of the test specification. (Author)

AD-419 425 Div. 8
OTS price $2.60

Bomac Labs., Inc., Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 5, 6 Aug-6 Nov 62,
by Gary G. Riska. 6 Nov 62, 18p.
Contract DA36 039sc85974
Unclassified report

Descriptors: (*Magnetrons, Industrial production), Manufacturing methods, Extremely high frequency, Tests, Life expectancy, Ceramic materials, Waveguide windows, Grinders, Industrial equipment, Anodes (Electron tubes), Cathodes (Electron tubes), Temperature, Humidity, Modulators.

Efforts were continued on a PEM Program to investigate minor constructional modifications in the present 70 Gc BL-221 magnetron design and to set-up a manufacturing facility capable of producing at a rate of fifty (50) tubes per month. Operational life tests on two magnetrons having ceramic windows were conducted. The first hob was manufactured using the hob grinding machine and associated facilities. Evaluation of (10) tubes using anodes made with the above facilities was completed. Work was continued on soft tube modulators and modification of cathode centering mechanism. Humidity-temperature tests were continued. (Author)

AD-419 448 Div. 8
OTS price $3.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STUDY AND INVESTIGATION OF MILLIMETER AND SUB-MILLIMETER WAVE RECEIVER TECHNIQUES.
Quarterly rept. no. 1, 1 Mar-31 May 63.
Aug 63, 25p.
Contract AF30 602 3046, Proj. 4505, Task 450501
RADC TDR63 365 Unclassified report

Descriptors: (*Millimeter waves, Detectors), (*Detectors, Millimeter waves), Crystal detectors, Standing wave ratios, Sensitivity, Noise (Radio), Waveguides, Beams (Electromagnetic), Attenuation, Electric fields, Extremely high frequency.

This program has as its goal the development of video detection techniques which are appropriate for the millimeter and submillimeter range of the spectrum. The sensitivity of the pyroelectric detector has been, increased to 3.3 x 10 to the minus 10th power amp/mw by using an improved mount for the detector element. The minimum detectable power has been measured to be 8 x 10 to the minus 7th power watt. This value agrees favorably with the calculated value of 3.8 x 10 to the minus 7th power watt. The reflection loss of the reflecting beam waveguide has been calculated and is found to depend upon the field polarization and the reflector spacing. An experimental transmission line has been set up in the laboratory and preliminary measurements indicate a loss below .02 db per iteration. The possibility of using crystal diodes for detectors at millimeter wavelengths is discussed and experimental results for two models of wall-current detectors are presented. (Author)

AD-419 478 Div. 8
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
ADAPTIVE DECISION SYSTEMS - I,
by Richard D. Smallwood and Theodore R. Strollo.
27 Dec 62, 16p.
AFCRL Came Bridge memo no. 13; Technical memo no. 62 14 Unclassified report

Descriptors: (*Adaptive control systems, Decision making), Signals, Automation, Reliability, Data processing systems, Filters detectors, Power, Thresholds, Images, Noise.

An important requirement for a system of the type being investigated under Project CAME BRIDGE is an automated decision system to operate on the data from a single channel. This problem can be described by the following process: A noisy signal is obtained upon which random events impose a signature which has some characteristics that are constant from event to event. The goal is to detect the occurrence of an event by the presence of these characteristics signatures and with as little time lag as possible. The achievement of this goal can be broken down into two problems: (1) The parameter problem -- (2) The decision problem -- These two problems are not independent, of course, since the reliability of a decision system will depend on the information content of the data parameters used. In particular, the optimum decision system will vary with the parameters used. The question arises then, as to whether a decision system can be built that will change its properties and thereby adapt to any data parameters chosen. A decision system that exhibits such adaptive properties is the subject of this paper. If this decision system can be built, it can then be used to investigate systematically the value of particular data parameters. (Author)

AD-419 485 Div. 8
OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A UNITED STATES AIR FORCE FOUR-WIRE ELECTRONIC SWITCHING DEVELOPMENT.
Final rept.,
by Frank Kozien and Richard C. Benoit, Jr.
Aug 63, 17p.
RADC TDR63 298 Unclassified report

Descriptors: (*Electronic switches, Transistor amplifiers), (*Switching circuits, Air force research), Multiplex, High frequency, Very high frequency, Ultrahigh frequency, Communication equipment, Radio equipment, Military requirements.

High speed, 4-wire circuit switching equipment was developed by the United States Air Force for universal use in tactical and fixed plant environments. Its design is based on the time-division-multiplex technique and, in association with the highway switching principle, comprises the switching and transmission network. The equipment is fully transistorized and adaptable for application in local, tandem, and long, tandem, and long haul switching modes. The transmission characteristics of this equipment are such that it is directly compatible with any transmission network that consists of HF, VHF, UHF, troposcatter, microwave, metallic circuits with or without carrier multiplex or a combination thereof for processing voice, digital data, graphics, etc., with a quality better than present commercial standards. High quality transmission characteristics make possible its insertion into a communication system consisting of six tandem links of approximately 6000 miles, where the length of a typical link may be as much as 2500 miles. The equipment has been extensively factory and field tested with highly satisfactory results and presently is operational within an integrated system environment performing local and long haul tandem switching functions. (Author)

AD-419 494 Div. 8
OTS price $14.50

Goodyear Aircraft Corp., Akron, Ohio.
AN ENGINEERING STUDY OF A POST-ATTACK ANTENNA SYSTEM.
Rept. for 4 May 62-30 Nov 62,
by D. D. Collins and G. W. Congdon. Dec 62, 1v.
Rept. no. GER10670
Contract AF30 602 2753, AFSC Proj. 5579, Task 557901
RADC TDR62 Unclassified report

Descriptors: (*Parabolic antennas, Inflatable structures), (*Radomes, Parabolic antennas), Automatic, Pneumatic devices, Drives, Rotation, Underground structures, Hardening, Containers, Storage, Antenna feeds, Reflectors, Materials, Model tests, Mathematical analysis, Stresses, Antenna radiation patterns, Manufacturing methods.

Results are described of an engineering study program for a post-attack, survivable antenna installation. The purpose of the program was to determine the feasibility of an air supported, integrated, radome-antenna configuration that can be packaged in a small volume, stored underground in a hardened enclosure, and capable of being quickly and automatically erected. Performance characteristics are to be comparable to a conventional 25 by 18 foot parabolic reflector. Theoretical computations were made to establish the aperture parameters, feed configuration, reflector shape, and reflector parallel conductor configuration. Tests were performed to confirm the theoretically established design configuration. Accuracy requirements were established for the reflector shape and parallel conductor arrangement. (Author)

AD-419 501 Div. 8, 15
OTS price $4.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
REALIZATION OF RANDOMLY VARIABLE ALL-PASS NETWORKS,
by E. Titlebaum. Dec 62, 39p. Research rept. no. EE553; Technical report no. 74
Contract DA36 039sc85272
Unclassified report

Descriptors: (*Networks, Analysis), Numerical analysis, Monte Carlo method, Feasibility studies, Experimental data, Photographs, Signals, Noise, Polynomials, Circuits, Electric potential, Matrix algebra, Design, Linear systems, Statistical functions, Integral equations, Pulse generators.

A realization of active all-pass networks is presented, which utilizes the same number of reactive elements as poles in the all-pass function. The pole positions of this network are then made to vary with the voltage on a varicap and the gm of a gated beam pentode. Means of obtaining step-control voltages with random amplitudes are considered, so that these networks can be used in Monte Carlo solutions to approximation problems. Gaussian noise is passed down a delay line, and if the input and output are sampled simultaneously, the input and output sample values are essentially uncorrelated. To demonstrate the feasibility of such networks, a sample and storage network is illustrated. Verification of the postulates is obtained by experimental data and photographs. (Author)

AD-419 502 Div. 8
OTS price $3.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
SIMULTANEOUS DETECTION OF TWO SIGNALS WITH ADAPTIVE MATCHED FILTERS,
by C. C. Tappert. 1 May 62, 35p. Research rept. no. EE531; Technical rept. no. 71
Contract DA36 039sc85272
Unclassified report

Descriptors: (*Signals, Detection), (*Matched filters, Signal-to-noise ratio), Noise analyzers, Statistical functions, Pulse counters, Band-pass filters, Input-output devices.

This study shows that an adaptive matched filter system can separate and individually detect the presence of two unknown input signals (of a certain restrictive class of signals) that occur simultaneously. The matched filters of this system are link amplifier structures with variable active parameters. (Author)

AD-419 512 Div. 8
OTS price $11.50

Stoddart Aircraft Radio Co., Hollywood, Calif.
IMPROVED LINE IMPEDANCE STABILIZATION METHOD.
Final rept.,
by J. W. Shaw and E. R. Byerley. Oct 60, 1v.
Contract NBy3189
Unclassified report

Descriptors: (*Radiofrequency interference, Measurement), (*Electrical impedance, Measuring devices (Electrical and electronic)), (*Transmission lines, Electrical impedance), Very low frequency, Low frequency, Medium frequency, High frequency, Very high frequency, Coaxial cables, Probes (Electromagnetic), Correlation techniques, Noise (Radio), Radio interference, Electric currents, Test equipment (Electronics).

The purpose of this contract is to develop improved or new techniques of measuring RF conducted interference at frequencies ranging from 14 kilocycles to 100 megacycles. To accomplish this, measurements were performed using new and improved line impedance stabilization methods and conducted interference testing techniques. Some of the improved techniques were as follows: (a) Application of the two-current-probe method for measuring impedance and current of actual impedance sources, and (b) Application of the use of half of a current probe for measuring surface currents. Also included are studies and comments upon the various aspects of line impedance stabilization network methods both from present and future possibilities. Recommendations for improvement in existing line impedance stabilization network methods based upon the experience gained in performance of the test described in Part I are included. (Author)

AD-419 527 Div. 8
OTS price $2.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE ON HIGH PERVEANCE CATHODE-RAY TUBES.
Quarterly progress rept. no. 8, 9 Mar-8 June 63,
by Edward T. Rate. 8 June 63, 26p.
Contract DA36 039sc85965
Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), Electron guns, Industrial production, Specifications, Tables, Model tests.

Specifications were reviewed and steps were taken to revise the technical specification. Production tooling and procurement of raw materials were completed. Several samples are being built to test the production facility. (Author)

AD-419 547 Div. 8
OTS price $8.60

Digital Computer Lab., U. of Illinois, Urbana.
PROPERTIES OF INTERCOUPLED TRANSMISSION LINES TERMINATED BY NEGATIVE RESISTANCE ELEMENTS WITH APPLICATIONS TO TUNNEL DIODE PULSE CIRCUITS,
by Henry Guckel. 28 June 63, 84p. Rept. no. 143
Contract Nonr1834 15
Unclassified report

Doctoral thesis.

Descriptors: (*Transmission lines, Propagation), (*Tunnel diodes, Transmission lines), Partial differential equations, Matrix algebra, Coding, Pulse modulation, Attenuation, Electromagnetic waves, Electrical impedance, Reflection, Stability.

Transmission of nanosecond and subnanosecond pulse-coded information between successive processors can be accomplished only if the physical interconnection takes the form of a transmission line terminated in its characteristic impedance, i.e., if reflectionless, distortion-free transmission between processors occurs. This fact is used as the basis for the investigation of intercoupled transmission lines. Differential matrix equations are developed from Maxwell's equations applied to multiconductor systems. The fact that wideband application is desired is used to restrict the general solutions to expressions which permit the propagation of a single TEM mode only. It is shown that lossy intercoupled transmission line systems can be constructed with the property of distortion-free, single-mode propagation (generalized Heaviside systems). The specialization of this type of network to two intercoupled lines, which in turn are restricted by unidirectional propagation requirements, leads to the double-pair transformer. The suppression of the two reflected waves is possible if the termination impedances are functionally related to each other. These relationships are derived and their physical implications are interpreted to demand that at least one of the termination impedances is an active impedance. (Author)

AD-419 562 Div. 8
OTS price $6.60

David Sarnoff Research Center, Princeton, N. J.
INFRARED PHOTOCONDUCTORS.
Summary rept.,
by M. L. Schultz. 31 Dec 62, 59p.
Contract Nonr222500
Unclassified report

Descriptors: (*Germanium, Photoconductivity), (*Infrared photoconductors, Germanium), Impregnation, Impurities, Cobalt, Gold, Nickel, Germanium alloy, Silicon alloy, Stability, Equations, Spectra (Infrared), Tables, Measurement, Electric potential, Blackbody radiation, Diffusion, Electric field, Photons, Preparation, Temperature, Resistance (Electrical).

An investigation was made of extrinsic germanium photoconductors activated with such impurities as cobalt or gold where a donor level near the valence band is compensated with an acceptor. Under these circumstances, the donor level becomes a pseudo-acceptor level and can serve as the activator for infrared photoconductivity. Under certain operating conditions, such activator centers should have much smaller capture cross-sections than normal acceptor centers, which should be reflected in greater responsivity. The efficacy of extrinsic germanium as a relatively short wavelength infrared photoconductor is also to be explored. Nickel as an impurity in germanium is an acceptor with an ionization energy of about 0.23 electron volts. Material with this activator will be prepared and tested. (Author)

AD-419 585 Div. 8
OTS price $4.60

Sylvania Electric Products Inc., Woburn, Mass.
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE.
Quarterly progress rept. no. 4, 1 Mar-31 May 63,
by C. F. Davis, Jr. and E. J. Feldman. 31 May 63, 1v.
Contract DA36 039SC86736
Unclassified report

Descriptors: (*Varactor diodes, Production), (*Manufacturing methods, Varactor diodes), Gallium alloys, Arsenic alloys, Epitaxial growth, Fixed contacts, Containers, Capacitance, Electric potential, Chemical milling, Diffusing, Impurities, Zinc, Tellurium, Arsenic, Photoengraving.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

Studies to obtain the processes necessary for the high volume production of gallium arsenide varactor diodes are described in this report. These investigations include studies of mesa contacts, epitaxial material, packaging, ohmic contacts and etching procedures. The results of the fabrication of completely epitaxial diodes and diffused epitaxial diodes are discussed as well as controlable etching procedures for volume production. (Author)

AD-419 607 Div. 8
OTS price $3.60

Cooke Engineering Co., Alexandria, Va.
POWER LINE HARMONIC INDUCTION TESTS.
16 May 61, 31p.
Contract NBy17827
Unclassified report

Descriptors: (*Radio interference, Audiofrequency), (*Coaxial cables, Radio interference), (*Transmission lines, Radiofrequency interference), Wave analyzers, Coupling circuits, Electromagnetic shielding, Test sets, Test methods.

Studies were conducted and measurements were taken to determine the degree of electro-magnetic energy coupling between power and control cables within the frequency range from 60 cycles to 5,000 cycles. A five kilowatt ac generator set was connected to permit a current of 44 amperes at 120 volts, 22 amperes at 240 volts, and 11 amperes at 480 volts to flow in a typical number six power cable. The control cable used for the measurements was RG-8/U, installed parallel to and at various spacings from the power cable for a distance of forty feet. Wave analyzer techniques were employed for measuring the components of the power line energy which were induced into the control cable. Calculations from measurements reveal the attenuation afforded by cable spacing, and that afforded by steel and aluminum conduit. (Author)

AD-419 665 Div. 8
OTS price $5.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
NOISE SENSITIVITY IN PROBABILITY STATE VARIABLE DEVICES,
by Harold E. Buroker. Aug 63, 44p.
AFIT GRE EE63 1 Unclassified report

Master's thesis.

Descriptors: (*Pattern recognition, Noise), Sensitivity, Probability, Theory, Experimental data, Analysis, Electrical networks, Learning, Artificial intelligence, Distribution.

An experiment was performed on a self-organizing machine called the LANNET. An investigation of the machine's ability to recognize noise in patterns that had been organized to 100% was accomplished. Simplified ARTRON theory was presented with the use of flow diagrams. The experimental data was tabulated. An analysis was performed on the results to include confidence limits. An interpretation based on the analysis forms the conclusion drawn from the experiment and recommendations are made for further investigations. (Author)

AD-419 671 Div. 8, 30
OTS price $5.60

New York U., Coll. of Engineering, N. Y.
PROJECTS DEALING WITH ADVANCED ELECTRON DEVICE TECHNOLOGY.
Aug 63, 43p. Status rept. no. 76
Unclassified report

Descriptors: (*Electronics, Armed forces research), (*Electronic equipment, Bibliographies), Microwave equipment, Microwave amplifiers, Waveguide filters, Electron tubes, Camera tubes, Electric connectors, Lasers, Reliability (Electronics).

This publication, which is issued by-monthly by the Advisory Group on Electron Devices, presents in summary form the results being achieved on projects sponsored by the Military Departments and other government agencies in the advanced electron device technology area. Items of collateral interest and extracts from non-government reports and publications will, from time to time, also be included. While intended to be reasonably comprehensive, the reports should not be considered complete accounts of all work in the area. For the sake of brevity, each item which deals with a continuing project is normally written in serial fashion from report to report; where warranted, a summary review is occasionally included. Individual items appearing in any one issue will reappear in future issues when additional information of a significant nature is available. A file of several issues of the reports is therefore necessary to obtain an overall view of the program. The information in any report is seldom more than six months old, and every effort is made to keep it as up-to-date as possible. (Author)

AD-419 695 Div. 8, 30
OTS price $8.60

University of Southern Calif., Los Angeles.
RESEARCH IN COMPUTER DECISION PROCESS.
Final rept.,
by Gregory O. Young and Robert McGhee. Aug 63, 94p. USCEC Rept. no. 98 101; EE27
Grant AF AFOSR62 69
Unclassified report

Descriptors: (*Computer logic, Decision making), (*Communication theory, Optimization), Nonlinear systems, Curve fitting, Matrix algebra, Equations, Partial differential equations, Radiofrequency filters, Signal-to-noise ratio, Servomechanisms.

The report consists of two separate parts representing two distinct investigations. The first part is concerned with optimization criteria in systems design; the second deals with the identification problem for nonlinear systems. (Author)

AD-419 696 Div. 8
OTS price $5.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
THE DESIGN AND CONSTRUCTION OF A HIGH-POWER UHF CRESTATRON,
by G. T. Konrad. Aug 62, 51p. Technical rept. no. 52
Contract AF30 602 2834, Proj. 5573, Task 557303
RADC TDR62 446 Unclassified report

Descriptors: (*Traveling wave tubes, Ultra high frequency), (*Microwave amplifiers, Power amplifiers), Gain, Electron guns, Helixes, Propagation, Electromagnetic waves, Velocity, Electrical impedance, Cathodes (Electron tubes), Beams (Electromagnetic).

The design, construction and experimental tests of a pulsed, high-power uhf Crestatron are

described. The design procedures outlined in this report are useful for the construction of Crestatrons in general. The data presented shows the operating characteristics of the Crestatron under small-signal as well as large-signal conditions. In addition some experiments on the harmonic output of the Crestatron are described. (Author)

9. FLUID MECHANICS

AD-419 033 Div. 9
OTS price $4.60

Rensselaer Polytechnic Inst., Troy, N.Y.
STABILITY OF FLOW BETWEEN ARBITRARILY SPACED CONCENTRIC CYLINDRICAL SURFACES INCLUDING THE EFFECT OF A RADIAL TEMPERATURE GRADIENT,
by J. Walowit, S. Tsao and R. C. Diprima.
14 Aug 63, 43p. Math rept. no. 61
Contract Nonr 59108
Unclassified report

Descriptors: (*Couette flow, Stability), Cylindrindrical bodies, Surfaces, Pressure, Temperature, Functions, Polynamials.

The stability of Couette flow and flow due to an azimuthal pressure gradient between arbitrarily spaced concentric cylindrical surfaces was investigated. The stability problems are solved by using the Galerkin method in conjunction with a simple set of polynomial expansion functions. Results are given for a wide range of spacings. For Couette flow, in the case that the cylinders rotate in the same direction, a simple formula for predicting the critical speed is derived. The effect of a radial temperature gradient on the stability of Couette flow is also considered. It is found that positive and negative temperature gradients are destabilizing and stabilizing respectively. (Author)

AD-419 143 Div. 9, 25
OTS price $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
VELOCITY FIELD INDUCED IN A LIQUID BY A ROTATING CONE,
by C. E. Miller and W. H. Hoppmann, II.
Sep 63, 21p.
Contract Nonr59116, Proj. S R009 01.01
Unclassified report

Descriptors: (*Fluid flow, Analysis), (*Liquids, Viscosity), (*Torque, Measurement), Viscosimeters, Vortices, Hydrodynamics, Velocity, Conical bodies, Simultaneous equations, Shear stresses, Tensor analysis, Deformation, Motion, Equations, Rotation, Fluid dynamic properties.

An analytical study is made of the steady-state velocity field induced in a liquid by a rotating cone. As a consequence of the experimental observations, velocity functions which very accurately define the flow have been developed. The functions are of such a nature that the centerline of a vortex and the flow about the centerline are accurately described. The boundary conditions at the surface of the rotating cone and at the fixed boundaries are satisfied. Also the continuity equation is satisfied. Finally, the stress field in the fluid has been studied in terms of the velocity functions. (Author)

AD-419 152 Div. 9
OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
STATIC PRESSURE DISTRIBUTIONS ALONG AN INCLINED SETBACK PLATE WITH ATTACHED JET USING THE HYDRAULIC ANALOGY,
by Joe L. Byrd and James G. Williams. 15 Aug 63, 24p.
AMC RG TR63 15 Unclassified report

Descriptors: (*Hydrostatic pressure, Water injection), (*Fluid flow, Water), (*Hydraulic models, Water injection), Subsonic flow, Distribution, Jets, Fluid flow, Specific heat, Velocity, Reynolds number, Density, Gases, Temperature, Simulation.

Water depth distributions along an inclined setback wall with a submerged jet attached have been determined on the water table, and attachment points noted at two different subsonic Mach numbers. Correction factors are used to convert water depth ratios in rectangular channel flow (k = 2.0) to pressure ratios in air (k = 1.4) The hydraulic analogy is summarized and the water table is described in detail. The results are compared with those of R. E. Olson. Good correlation is obtained considering that the test conditions were not exactly identical. (Author)

AD-419 242 Div. 9
OTS price $1.10

Scripta Technica Inc., Washington, D. C.
APPROXIMATE ANALYSIS OF LIFTING FORCES ON A WING NEAR A FREE SURFACE (Priblizhennyi Raschet Podemnoi Sily Kryla Vblizi Svobodnoi Poverkhnosti),
by A. N. Panchenkov. Aug 63, 3p.
BUSHIPS Trans. no. 825 Unclassified report

Trans. from Zh. Prikl, Mekh. Fix. (PMTF), no. 4, pp. 67-68, Nov-Dec 1960.

Descriptors: (*Hydrofoils, Hydrodynamics), Fluid flow, Velocity, Mathematical analysis, Flat plate models, Lift.

AD-419 245 Div. 9, 30
OTS price $2.60

Catholic U. of America, Washington, D. C.
RESEARCH ON FLOW SEPARATION IN WESTERN EUROPE,
by Paul K. Chang. July 63, 28p.
Grant AFOSR62 80
AFOSR 4854 Unclassified report

Descriptors: (*Supersonic flow, Separation), (*Hypersonic flow, Separation), Swept wings, Base flow, Shock waves, Boundary layer, Research program administration, Reviews, Swept back wings, Inteference.

A survey is reported of research activities on Flow Separation in Western Europe and West Berlin, made in the late summer of 1962. The major scientific countries--France, Germany, and especially England-- are well aware of the importance of the problmes of flow separation, and have engaged extensively in research. Model basins and hydrodynamics institutes in European countries are very much interested in the problems of flow separation, but except for the Institut fur Schiffbau der Universitat, Hamburg, and in limited scope at Skipmodelltanken, Trondheim, Norway, it is felt that no special research on this subject has been carried on. Hence, most of the work listed in the following pages was done at the aerodynamic institutes. The main emphasis in research is placed on the fields of (1) Flow Separation on Swept Wings, (2) Base Flow, (3) Interaction between Shock Wave and Boundary Layer, and (4) Generalized Concept of Flow Separation. (Author)

AD-419 309 Div. 9, 30
OTS price $8.50

Northrop Corp., Hawthorne, Calif.
NUMERICAL ANALYSIS OF SUPERSONIC FLOW THROUGH CURVED CHANNELS,
by J. Der, Jr., B. N. Mullings, G. H. Hoffman and B. N. Pridmore Brown. July 63, 280p.
Contract AF33 657 8851, Proj. 7065, Task 7065 01
ARL 63 117 Unclassified report

Descriptors: (*Ducted bodies, Supersonic flow), (*Cascade structures, Supersonic characteristics), Duct inlets, Duct bends, Viscosity, Blunt bodies, Boundary layer, Separation, Vortices, Shock waves, Supersonic characteristics, Mathematical models, Programming computers, Differential equations, Partial differential equations, Laminar boundary layer, Numerical analysis, Interference.

An IBM FORTRAN program for calculating supersonic flows through curved channels. Included in the program are: (1) a second order Belotserkovskii procedure for calculating the flow field around the forward part of blunt blades, (2) a general method of characteristics procedure for calculating supersonic flow fields, (3) automatic procedures for calculating interactions of shocks of opposite families, shock interactions with a wall and with a vortex sheet or slipstream, and (4) a finite difference laminar boundary-layer procedure for calculating viscous region of the flow. Three sample calculations as well as the listing of the FORTRAN program are presented. (Author)

AD-419 356 Div. 9
OTS price $3.60

Army Materials Research Agency, Watertown, Mass.
ANALYTICAL STUDY FOR A HYDRODYNAMIC TEST SYSTEM,
by Charles W. Semple. Sep 63, 25p.
Proj. 1C542718D387
AMRA TR63 12 Unclassified report

Descriptors: (*Hydrodynamics, Tests), (*Pressure vessels, Design), Loading (Mechanics), Analysis, Measurement, Compressible flow, Density, Pressure, Fittings, Numerical analysis, Fluid flow, Equations.

Analytical equations relating specimen pressure to rise time were developed for specimens subjected to internal pressure by a hydrodynamic loading system. Rise time measurements were made during dynamic pressurization of a pressure vessel, and the experimental and analytical results compared. The effects of various system parameters on rise time were established from the analytical equations. Design guide lines are outlined for the construction of similar hydrodynamic systems. (Author)

AD-419 378 Div. 9
OTS price $8.60

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
EXPERIMENTS ON THE FLUTTER OF FLAT AND SLIGHTLY CURVED PANELS AT MACH NUMBER 2.81,
by William J. Anderson. June 62, 72p. SM62 34
Contract AF49 638 220
AFOSR 2996 Unclassified report

Descriptors: (*Structural shells, Flutter), (*Flat plate models, Flutter), Aeroelasticity, Supersonic characteristics, Supersonic flow, Aerodynamic configurations, Vibration, Pressure, Model tests, Two-dimensional flow.

Two series of panel flutter tests were carried out in the Jet Propulsion Laboratory's 12 inch supersonic wind tunnel. Flat and slightly curved panels were tested at Mach number 2.81. The flat, rectangular panels were designed to study two-dimensional flutter. They were clamped at front and rear with free sides which extended into the boundary layer at the sides of the tunnel. These panels flutter in a two-dimensional mode which occurred at a thickness ratio approximately 15% different from the predictions of existing theory. One of the panels exhibited a three-dimensional ''rocking'' flutter which has not been observed or discussed before. A theory is developed for this type of flutter. The slightly curved panels were shallow circular cylindrical shells with the generators perpendicular to the flow direction. These panels were all of aspect ratio one. It was found that the effect of curvature was destablizing and that the effect of internal pressurization was stabilizing. (Author)

AD-419 492 Div. 9, 30
OTS price $19.75

Aerospace Corp., Los Angeles, Calif.
FLUTTER AND VIBRATION ANALYSIS BY A COLLOCATION METHOD: ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
by William P. Rodden, Edith F. Farkas and Heather A. Malcom. 31 July 63, 1v. Rept. no. TDR1693230 11TN14
Contract AF04 695 169
SSD TDR63 157 Unclassified report

Descriptors: (*Flutter, Aerodynamic configurations), (*Vibration, Aerodynamic configurations), Mathematical models, Structures, Aerodynamic characteristics, Flexible couplings, Aeroelasticity, Matrix algebra, Digital computers, Damping, Velocity, Data processing systems, Programming (Computers), Mathematical analysis.

A collocation solution of the flutter and vibration problems for a multiple component system is presented. The formulation utilizes structural, aerodynamic, and inertial characteristics in the form of matrices of structural and aerodynamic influence coefficients and a mass matrix, respectively, for each component. The use of a rigid-body modal matrix permits a general analysis for a system free in space with up to six rigid-body degrees of freedom. The solution also utilizes a newly developed subroutine for finding the eigenvalues and eigenvectors of a non-Hermitian matrix having close roots, and obtains the corresponding values of frequency, required structural damping, and velocity of the flutter system. The Aerospace IBM 7090 Computer Program No. LD005A provides the flutter or vibration solution for a system composed of as many as 20 flexible components with a maximum total of 49 collocation control points. An option is provided to vary the density as well as the reduced velocity. Another option is provided to yield the modes from a vibration analysis in a punched-card format for use in flutter analysis by modal methods. (Author)

AD-419 499 Div. 9, 27
OTS price $8.60

Stanford U., Calif.
THE EFFECT OF FILM COOLING ON THE HEAT TRANSFER BETWEEN A SHROUDED ROTATING DISK AND A RADIALLY INWARD FLOW,
by Darryl E. Metzger. Aug 63, 85p. Technical rept. no. 58
Contract Nonr22523, Proj. NR090 342
Unclassified report

Descriptors: (*Disks, Flat plate models), Rotation, Heat transfer, Film cooling, Gas flow, Axially symmetric flow, Shroud rings, Gas turbines, Model tests, Mathematical prediction, Differential equations, Cooling, Gas turbine blades.

A study of the cooling effect of a film stream on the heat transfer between a shrouded rotating disk and radially inward main flow stream is presented. The investigation is intended as a model study of the film cooled radial flow gas turbine. Film heating and film cooling are shown to be similar problems described by the same set of equations when property variations can be neglected. Experimental results were obtained from a film heated, rotating disk facility. These results were obtained over the range of radial flow gas turbine operating conditions. The heat transfer behavior of the main stream only was determined separately, and the film cooling results are presented as ratios of the heat transfer obtained with film cooling to the heat transfer obtained with only a single radial inflow. An analysis of the heat transfer to a film cooled, uniform temperature flat plate is presented. This analysis predicts the form but not the magnitude of the results obtained on the rotating disk. (Author)

AD-419 568 Div. 9
OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL STUDY OF THE USE OF A THIN FLOWING WATER FILM AS A MEANS OF PREVENTING EROSION,
by Robert Alexander Mazik. Aug 63, 63p.
AFIT GAE ME63 8 Unclassified report

Master's thesis.

Descriptors: (*Cavitation, Erosion), Liquid jets, Hydrodynamics, Liquids, Protective coverings, Films, Water, Water impingement, Model tests, Metal plates, Spacecraft, Hydraulic systems.

Since systems for use in space depend upon reliability and continuous trouble-free operation for extended periods of time, erosion in fluid systems due to cavitation and impingement attack has become a major problem. This study concerns the use of a thin water film flowing parallel to a surface on erosion caused by the impingement of another stream of water. Using lead specimens a comparison was made of the weight loss due to erosion with and without the flowing protective film. The film thickness was maintained at 0.022 inches. The total pressure of the film was increased in steps to a maximum obtainable value of approximately 38% of the impinging stream. At this value the weight loss in a 15 minute period was reduced to about 88% of the weight loss with no protective film. The study proved there is some merit to the use of flowing liquid protective films as a means of resisting erosion. There also appears to be a value of pressure ratio where the erosion phenomena may be stopped completely. (Author)

AD-419 569 Div. 9, 27
OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
JET SWITCHING PHENOMENA IN A CHOKED FLOW COANDA-EFFECT NOZZLE,
by C. Neale Elsby. Aug 63, 120p.
AFIT GA/ME/63 2 Unclassified report

Master's thesis.

Descriptors: (*Nozzles, Coanda effect), Jets, Secondary injection, Theory, Fluid flow, Injection, Thrust vector control systems, Two-dimensional flow, Geometry, Design, Tests, Test equipment, Instrumentation, Pressure, Thrust, Schlieren photography, Interferometers, Surface properties, Deflection.

An experimental study is made to provide information about basic flow characteristics and jet switching phenomena in a relatively large scale Coanda-Effect nozzle. A variety of nozzle geometries were explored to give fairly complete coverage to the anticipated flow situations. Although the nozzle was designed to function with both subsonic and supersonic flow, only the choked flow condition was investigated. (Author)

AD-419 595 Div. 9, 13
OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A STUDY OF THE RAPID SATURATION OF LARGE VOLUMES OF GAS,
by David Michael Hickman. Aug 63, 63p.
AFIT GAE ME63 6 Unclassified report

Master's thesis.

Descriptors: (*Vaporization, Instrumentation), Air, Water, Compressed air, Fluid flow, Humidity, Pressure, Injectors.

Six plexiglass vaporizers which incorporate air injected tangentially into a circular base containing water were tested over a wide range of flow rates. One model, an eight-by-eight-inch circular, truncated cone with a twelve-inch-tall chimney, successfully produced saturated air at rates between 0.0522 lbm/sec to 0.0826 lbm/sec (40 to 60 cu. ft/min). A qualitative analysis of this device is presented which is successful in describing the flow processes involved. Furthermore, an analysis of the data obtained indicates the feasibility of a gravity-feed reservoir, with an entry tap under the rotating water, as a method of replenishing water by evaporation. (Author)

AD-419 654 Div. 9, 25
OTS price $7.60

Weidlinger, Paul, New York.
FORCED VIBRATIONS OF AN ELASTIC CIRCULAR CYLINDRICAL BODY OF FINITE LENGTH SUBMERGED IN AN ACOUSTIC FLUID. PART II - COMPUTATIONAL PROCEDURES AND NUMERICAL EXAMPLE,
by Melvin L. Baron and Alva T. Matthews. Jan 63, 73p. Technical rept. no. 2
Contract Nonr345400, Proj. NR064 464
Unclassified report

Descriptors: (*Cylindrical bodies, Fluid mechanics), Acoustics, Pressure, Velocity, Elasticity, Fluids, Stresses, Equations, Mathematical analysis, Theory, Acoustic properties, Vibration.

The theoretical work and analytical procedures leading to the evaluation of the pressure and velocity fields produced in an acoustic fluid by the forced vibrations of an elastic circular cylindrical body of finite length which is submerged in the fluid have been presented. The application of the theory to problems of practical interest is discussed in the present report and numerical results are presented for a sample axi-symmetrical problem. (Author)

10. FUELS AND COMBUSTION

AD-419 050 Div. 10, 15
OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
FUEL OPTIMIZATION IN ORBITAL RENDEZVOUS,
by A. A. Goldstein and T. I. Seidman. Aug 63, 17p. Rept no. D1 82 0292 and Mathematical note no. 317
Unclassified report

Also available from the authors.

Descriptors: (*Rendezvous spacecraft, Fuel consumption), (*Fuel consumption, Optimization), Rockets, Orbital trajectories, Satellites, Thrust, Differential equations, Functions, Integral equations, Topology, Inequalities, Measure theory, Convex sets, Linear system, Real variables.

AD-419 097 Div. 10, 4
OTS price $7.60

Goettingen U. (Germany).
DETONATION AND SHOCK-TUBE STUDIES OF HYDRAZINE AND NITROUS OXIDE.
Rept. for 1 Mar 62-28 Feb 63,
by A. Jost, K. W. Michel, J. Troe and H. Gg. Wagner. Sep 63, 63p.
Contract AF61 514 1142, Proj. 7013, Task 7013 01
ARL 63 157 Unclassified report

Descriptors: (*Hydrazine, Detonations), (*Nitrogen compounds, Oxides), (*Detonations, Reaction kinetics), Mixtures, Velocity, Shock tubes, Pyrolysis, Absorption spectrum, Shock waves, Helium, Design, Ammonia.

Experiments investigating the detonability of hydrazine - nitrous oxide mixtures are reported. No detonations could be produced in mixtures containing less than 7 vol-% of N20. Pure hydrazine shows a detonation velocity of about 2450 m/sec. Spectroscopic investigations of the wake behind N_2H_4 detonations, however, revealed great amounts of NH_3 which had not yet disappeared 300 mu sec behind the detonation front. Some evidence based on the pressure dependence in the NH_3 production suggests that these detonations are inherently unstable. Shock-tube studies of the pyrolysis of nitrous oxide and hydrazine continued. Absorption coefficients of N20 up to 1800 K were measured. Measurements of the decomposition rate of N_2H_4 behind reflected shock waves with an excess of He were extended up to 1550 K. Evaluation of the half-lives indicated that the rate of decomposition does not depend upon the nature of the carrier gas. (Author)

AD-419 166 Div. 10
OTS price $4.60

Princeton U., N. J.
A CRITICAL REVIEW OF RECENT RESEARCH ON THE MECHANISM OF IGNITION OF SOLID ROCKET PROPELLANTS,
by M. Summerfield, R. Shinnar, C. E. Hermance, and J. Wenograd. 26 Aug 63, 47p. AEL rept. no. 661
Grant AF AFOSR92 63
Unclassified report

Presented at the 14th Congress of International Astronautics Federation, September 1963, Paris.

Descriptors: (*Reviews, Ignition), (*Solid rocket propellants, Ignition), Theory, Diffusion, Esters, Convection, Shock tubes, Rocket motors (Solid propellant), Bibliographies, Flames, Reports, Organic nitrogen compounds.

Contents:
Solid phase ignition
Gas phase ignition
Ignition due to heterogeneous reactions at the gas-solid interface
Hot wire ignition of composite solid propellants
Explosion tube propellant ignition experiments
Ignition of nitrate ester propellants by forced convection
Ignition of nitrate ester propellant in a pressurized oven
Propellant ignition by high convective heat fluxes
The ignition of composite solid propellants in a shock tube
Ignition of composite propellants by a radiant energy flux
Composite propellant ignition in a small rocket motor
Convective ignition experiments on a composite propellant

AD-419 229 Div. 10
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RATE OF CHEMICAL REACTION AND ITS EFFECT ON THE PROCESS OF DROPLET COMBUSTION,
by V. R. Kuznetsov. 24 July 63, 8p.
FTD TT63 653 Unclassified report

Trans. from Inzhenernyy Zhurnal, 2:4, pp. 344-349, 1962.

Descriptors: (*Fuels, Combustion), (*Combustion, Fuels), Fuel burn up, Fuel sprays, Liquids, Burning rate, Equations, Chemical reactions.

AD-419 428 Div. 10
OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
A MATHEMATICAL STUDY OF THE MECHANISM OF WOOD BURNING.
Technical progress rept. no. 3, 1 Feb 62-1 Mar 63,
by W. D. Weatherford, Jr. 1 Mar 63, 32p.
Contract CST362, ARPA Order 90
Unclassified report

Descriptors: (*Wood, Combustion), (*Combustion, Mathematical analysis), Heat transfer, Solids, Surfaces, Temperature, Ignition.

The results of the present study have further confirmed that thermal conditions are not conducive to stable burning of wood-like materials until the temperature of the solid surface begins to increase more rapidly than would that of an infinitely-thick slab of identical material exposed to an identical convective-source temperature. In order to adequately describe this critical thermal condition for symmetrical, two-sided heating, a concept of a thermal feed-back wave being propagated from the surface of symmetry to the heated surface is introduced, and the time required for this ''wave'' to reach the heated surface has been derived. These studies indicate that the critical heating time corresponding to the initial occurrence of the critical thermal conditions required for stable burning may be evaluated quantitatively. (Author)

AD-419 429 Div. 10, 9
OTS price $4.60

Battelle Memorial Inst., Columbus, Ohio.
A MODEL STUDY OF THE INTERACTION EFFECTS OF MASS FIRES.
Summary rept. no. 2,
by A. A. Putnam and C. F. Speich. 27 Mar 63, 40p.
Contracts OCD OS62 89 and CST717
Unclassified report

Descriptors: (*Fires, Models (Simulations)), (*Flames, Propagation), Fuels, Wind, Buoyancy, Turbulence, Diffusion, Configuration, Mathematical analysis, Theory, Gas flow.

This research program has confirmed the conclusion of the previous summary report that a valid model for studies of mass fires can be produced by using gaseous fuel sources. In addition to the basic requirement that the individual fuel sources produce flames that are of the buoyancy-controlled turbulent diffusion type, specific conclusions are presented as to their spacing, firing rate, number, and array pattern to produce different classes of flames. These classes are arrays of flames acting as single-point sources, acting as area sources, acting as a line source, and acting as a number of individual sources. A postulated close relation between line fires and area fires treated as if their perimeter were one-sided line fires was experimentally confirmed. (Author)

AD-419 432 Div. 10
OTS price $3.60

Monsanto Research Corp., Dayton, Ohio.
A RESEARCH PROGRAM FOR UNDERSTANDING THE MECHANISMS OF FLAME INHIBITION.
Quarterly progress rept. no. 1, 15 Nov 62-15 Feb 63,
by G. B. Skinner, G. H. Ringrose and A. D. Snyder. 15 Feb 63, 29p.
Contract AF33 657 10304, Proj. 6075, Task 607505
Unclassified report

Descriptors: (*Flames, Inhibition), (*Boranes, Combustion), (*Diboranes, Pyrolysis), Hydrides, Oxidation, Boron compounds, Shock tubes, Pentaboranes, Air, Oxygen, Hydrogen, Argon.

A low-pressure burner for measuring flame speeds and spectra of inhibited borane-air mixtures has been completed and tested. Shock tube studies of two diborane-argon mixtures at 600 to 700 K indicate first order kinetics for the decomposition of diborane. A rapid approximate method for calculating induction times of hydrogen-oxygen-argon mixtures is being developed. (Author)

AD-419 567 Div. 10
OTS price $5.60

Southwest Research Inst., San Antonio, Tex.
THE USE OF MODELS FOR THE INVESTIGATION OF FIRE SPREAD.
Final rept.,
by John E. Ambrose, Lester A. Eggleston and Calvin H. Yuill. 19 Aug 63, 52p.
Contract DA49 146XZ146, DASA Proj. 12 024
Unclassified report

Descriptors: (*Models (Simulation), Fires), (*Fires, Models (Simulation)), Simulation, Electronic equipment, Propagation, Combustion, Mathematical models, Ignition, Climatology, Feasibility studies.

The purpose of this program was to investigate the use of models for the study of fire spread and the use of modeling techniques for defining those factors which contribute to the development of mass fires. The scope of the program was later expanded to demonstrate the practicability of a new concept for the nondestructive modeling of mass fires. It is concluded that mass fires cannot be modeled with information now available. Extrapolations up and down of existing data and assumed probabilities would require extensive tests before confidence in modeling techniques could be established. Direct experimentation on small-scale models shows promise, and their use is discussed in detail. The feasibility of an electronic fire simulator has been demonstrated and offers attractive possibilities. A study of typical conflagrations indicated a good possibility for the calibration of mass fire models using actual situations. Recommendations for the further development of models are included. (Author)

AD-419 582 Div. 10, 27
OTS price $2.60

Sheffield U. (Gt. Brit.).
COMBUSTION INSTABILITY RESEARCH ON SOLID AND LIQUID PROPELLANT ROCKET MOTORS AT SHEFFIELD UNIVERSITY,
by J. Swithenbank. June 63, 24p. Rept. no. HIC 22; Technical note no. 1
Grant AF EOAR63 101
AFOSR 5292 Unclassified report

Descriptors: (*Rocket motors, Combustion), (*Combustion, Stability), Rocket motors (Liquid propellants), Rocket motors (Solid propellants), Gas flow, Vortices, Oscillation, Acoustics, Photographic analysis.

Rocket motor combustion instability has been under investigation. The first phase of this work concerned the high frequency tangential mode of oscillation, in a premixed gaseous fuelled rocket motor. In particular the first tangential travelling mode was studied because this is considered the most destructive mode of instability. The research was extended to cast double base propellants. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-419 666 Div. 11, 9, 1
OTS price $5.60

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
THE PROPULSION ASPECTS OF GROUND EFFECT MACHINES,
by Robert W. Pinnes. Jan 60, 53p.
NAVWEPS Rept. no. RRSY60 1
Unclassified report

This paper was prepared for presentation at the 28th Annual Meeting of the Institute of the Aeronautical Sciences to be held in New York City during the week of 25-29 January 1960.

Descriptors: (*Ground effect machines, Propulsion), (*Propulsion, Ground effect machines), Pressure, Lift, Algebra, Equations, Gas flow, Velocity, Internal combustion engines, Annular nozzles, Design, Seals (Stoppers), Turbo propeller jet engines.

The ground effect machine concept has introduced a new and unique ''propulsion'' requirement - that of establishing and containing a high pressure air bubble under the base of the vehicle for both hovering and forward speed conditions. This paper reviews certain facets of this new problem. Some recently available test results are compared with some earlier theoretical predictions, and the degree of correlation is indicated. Some earlier predictions of ground effect machine potential are then modified on the basis of these test data. It is demonstrated that the ground effect machine has an extremely attractive lift-to-horsepower ratio capability. In addition, certain possibilities for improving this capability still further are discussed. The availability of suitable engines is investigated. It is shown that a good selection of engines - both turboprop and reciprocating - is available. (Author)

12. GUIDED MISSILES

AD-419 048 Div. 12, 30
OTS price $11.00

American Machine and Foundry Co., Stamford, Conn.
LUNAR ALIGHTMENT SYSTEMS INVESTIGATION.
Rept. for Feb 62-May 63,
by Andrew B. Burns and James A. Plascyk.
June 63, 137p.
Contract AF33 657 8197, Proj. 1369, Task 136903
ASD TDR63 454 Unclassified report

Report on Mechanical Subsystems for Aerospace Vehicles.

Descriptors: (*Lunar craft, Landing gear), (*Manned spacecraft, Lunar craft), Design, Airframes, Structures, Soft landings, Impact shock, Stresses, Loading (Mechanics), Structural shells, Structural parts, Structural properties, Metals, Alloys, Steel, Aluminum alloys, Magnesium alloys, Titanium alloys, Hydraulic systems, Pneumatic systems, Mathematical analysis, Test methods, Stability, Aerospace craft, Weight, Honeycomb cores, Launching.

Mission parameters are estimated for a manned lunar alightment. Undercarriage concepts are developed which provide for alightment on unprepared lunar surfaces and provide the necessary support for subsequent launch from the lunar surface. A novel concept is described which places steel honeycomb energy absorption elements at the ends of four self-aligning strut mechanisms. The self-aligning feature, which is applicable to any number of surface contactors, results in an alightment system whose bulk and weight are a small fraction of the comparable quantities for systems using fixed undercarriages. It has been found that the incorporation of auxiliary launch engines in the alightment system to utilize salvaged alightment energy or chemical fuels offers no advantage. Analytical background material is reported and an experimental program which verified the feasibility of the self-aligning feature is described. (Author)

AD-419 068 Div. 12
OTS Price $21.00

Air Force Inst. Of Tech., Wright-Patterson Air Force Base, Ohio.
OPTIMIZATION OF CORRECTIVE SEQUENCES FOR INTERPLANETARY TERMINAL TRAJECTORIES,
by James E. Funk and George R. Hennig. Aug 63, 345p. Rept. no. GA/PHYS/63 5.6
Unclassified report

Masters thesis,

Descriptors: (*Guided missile trajectories, Terminal ballistics), (*Interplanetary trajectories, Terminal ballistics), Errors, Dynamic programming, Programming (computers), Sequential analysis, Optimization.

The effect an error velocity has on the hyperbolic transfer trajectory in the planet's local gravity field is investigated. The number, direction, magnitude and position of the correction impulses which optimally guide the spacecraft to a circular parking orbit is determined. The two approaches used are: (1) a fixed and predetermined orbital radius; (2) an allowable variation of orbital radii over a specified range. Forced geometric and dynamic programming correction sequences analyses are used. The results prove a geometrical correction sequence to be optimum. The corrective velocity sum is always less than 5% of the basic velocity sum. (Authors)

AD-419 083 Div. 12
OTS price $10.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE DYNAMICS OF GYROSCOPE DAMPING FOR GEOCENTRIC ATTITUDE CONTROL,
by Martin Messinger and Howard E. Parker. May 63, 119p. Research rept. no. PIBMRI1147 63
Grant AFOSR62 295
Unclassified report

Descriptors: (*Attitude control systems, Satellites (Artificial)), (*Gyroscopes, Damping), Gyro stabilizers, Gyroscopes, Damping, Configuration, Euler's angles, Matrix algebra, Mathematical analysis.

The geocentric attitude stabilization of an earth satellite is studied. The system considered in this report utilizes differential gravity to control the vehicles orientation and gyroscopes to provide vehicle damping. Several different gyroscope configurations that provde indirect gyroscope damping about all three of the vehicle axes are presented. For each of these configurations, the equations governing the dynamics of the system are systematically developed in terms of the attitude deviation angles and the parameters of the orbit. The expressions for the steady state deviation angles and the torque which must be supplied by gyroscope torquers are also obtained. (Author)

AD-419 096 Div. 12
OTS price $5.60

Boeing Co., Seattle, Wash.
WS-133A GOVERNMENT FURNISHED SUPPORT AT VANDENBERG AIR FORCE BASE.
11 Jan 62, 57p. Rept. no. D2 9202
Contract AF04 647 7757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Test facilities), Ground support equipment, Military facilities, Buildings, Management engineering.

This document defines facilities, communications, general services, special services, equipment and supplies support to be provided locally by the Air Force (and the Contractor as applicable), at Vandenberg Air Force Base for the Contractor's and Associate Contractors' use in conducting the WS-133A Weapon System Wings I, II and III-V Test Programs as described in Contract AF04 647 757. (Author)

AD-419 107 Div. 12, 5, 8, 13, 26
OTS price $11.00

Sylvania Electric Products Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN) -- FACILITIES DESIGN CRITERIA, NEW OPERATIONAL LAUNCH AND LAUNCH CONTROL FACILITIES,
by D. I. Levin. 23 Sep 63, 1v. MPO SR17 3 205
Contract AF04 694 261
Unclassified report

Supersedes rept. no. MOP SR17 3 203, dtd. 29 Mar 63, AD-405 372.

Descriptors: (*Guided missiles (Surface-to-surface), Ground support equipment), (*Guided missiles, Electronic equipment), (*Strategic weapons, Launching), Launching sites, Design, Control systems, Cable assemblies, Configuration, Electrical equipment, Communication systems, Construction, Management engineering, Mechanical drawings, Power equipment.

This release of information defining Facilities Design Criteria is prepared based on objectives and requirements resulting from various technical mettings. The criteria presented are thus a consolidation of the above events and their derived conclusions with existing data already contained in the previous Facilites Design Criteria, Sylvania Document MPO-SR-17-3-204 of 31 May 1963 and Revision to same dated 12 July 1963. The principal areas of change, addition, deletion, and interface resolution as a result of the above itemized influences are reflected largely within the sections pertaining to the Launch Control Center, Launcher Equipment Room, and Antenna Farm. Particular attention should be given to Equipment Placement within the LCC, the Cable Tray requirements within the LCC, Cable Routing within the LER, and Antenna Plot Plans and conduit to same at the LCF and LF sites. (Author)

AD-419 147 Div. 12, 5
OTS price $2.60

Boeing Co., Seattle, Wash.
STP III SPECIAL TEST REPORTS ELECTRICAL AND ELECTRONIC SYSTEMS.
7 Aug 63, 20p. Rept. no. T2 3102 3
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Electronic equipment), (*Magnetic tape, Checkout equipment), Electrical equipment, Checkout procedures, Electronic equipment, Recording systems, Automatic, Launching sites.

The checkout of the REACT 2-001 Tape was conducted. Three test runs were made using the REACT 2-001 Tape to bring the system up to Strategic Alert. Recordings were made at various times during the Start-up and in Strategic Alert to record information sent out by the computer via the character output lines. The data was analyzed by Autonetics representatives and the REACT 2-001 Tape was found to be compatible with the operating weapon system. (Author)

AD-419 148 Div. 12
OTS price $1.60

Boeing Co., Seattle, Wash.
STP III SPECIAL TEST REPORTS MECHANICAL SYSTEMS.
15 Apr 63, 13p. Rept. no. T2 3102 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Transporter-erectors, Guided missiles (Surface-to-surface)), Actuators, Hydraulic systems, Bleed systems, Tests, Pipes, Pressure.

Tests were made to investigate and to determine the Transporter-Erector structure and erection actuator displacements, and actuator pressure during the hydraulic bleeding operation with the T-E off the pylons and the container-to-rear carriage tiedown pins removed. The test was conducted to substantiate an analytical analysis made in response to a report from Vandenburg AFB that the T-E actuators extended when bleeding, with the T-E not on pylons. It was deemed advisable to investigate the condition to determine acceptable maintenance procedures for erection actuator bleeding. (Author)

AD-419 205 Div. 12, 26
OTS price $3.60

General Dynamics/Convair, San Diego, Calif.
DEVELOPMENT OF A HIGH-TEMPERATURE NUCLEAR-RADIATION-RESISTANT PNEUMATIC POWER SYSTEM FOR FLIGHT VEHICLES.
Quarterly rept., 25 June-24 Sep 63.
24 Sep 63, 31p. GDC63 197
Contract AF33 616 7582
Unclassified report

Descriptors: (*Aerospace craft, Pneumatic systems), (*Pneumatic systems, Radiation effects), Temperature, Turbopumps, Centrifugal compressors, High temperature research, Tests, Pressure, Design, Configuration, Stability, Pressure regulators, Valves, Pneumatic servomechanisms.

The preliminary study for Phase II of the turbo-compressor program was completed; a satisfactory configuration was established for a four-stage centrifugal compressor utilizing a single shaft. Three high-temperature (1,500 F) experimental test runs were conducted on the pilot portion of the Model X pressure regulator while experimental room temperature testing of the Model F relief valves also was completed with satisfactory results. (Author)

AD-419 224 Div. 12
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
GYROSCOPIC EFFECT IN BALL BEARINGS OF FUZE ARMING VANE,
by Joanne E. Highdale and David L. Blanchard.
22 July 63, 15p.
NOL TR63 167 Unclassified report

Descriptors: (*Guided missile fuzes, Ball bearings), (*Arming devices, Free-fall missiles), Velocity, Steel, Nylon, Halocarbon plastics, Wind tunnels, Mathematical analysis, Rotation, Spin.

The rotating section of a fuze armed by a vane spinning in a windstream due to free fall was variously mounted with steel ball bearings, nylon ball bearings, and teflon O-rings. Wind tunnel tests were run and theoretical analyses made to determine the rise time and the steady

state speed of the vane as a function of the air speed. An expression for the steady state velocity of the vane when mounted with ball bearings was developed which showed that gyroscopic action of the balls determined the maximum angular velocity of the vane; the theoretical results are in good agreement with experimental data. (Author)

AD-419 336 Div. 12
OTS price $2.60

Boeing Co., Seattle, Wash.
TECHNICAL DATA REQUIREMENTS FOR MOBILE MINUTEMAN DEFINITIVE CONTRACT,
by W. Quammen. Aug 60, 20p. Document no. D2 4319 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Weapon systems), (*Weapon systems, Guided missiles (Surface to surface)), Military requirements, Reliability, Ground support equipment, Data, Specifications, Air Force, Guided missile personnel.

This document establishes the technical data (Part A) and drawing requirements (Part B) to be submitted by the Boeing Airplane Company as System Integration Associate Contractor for the WS-133A-M Mobile Minuteman Weapon System. For convenience, the requirements specified herein have been related to the applicable item or items of the Mobility Work Statement of Definitive Contract AF04(647)289. (Author)

AD-419 337 Div. 12
OTS price $4.60

Boeing Co., Seattle, Wash.
TECHNICAL DATA REQUIREMENTS FOR H AND D MINUTEMAN DEFINITIVE CONTRACT,
by D. Legan. 28 Mar 60, 31p. Document no. D2 4319
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Military requirements), (*Military requirements, Guided missiles (Surface-to-surface), (*Specifications, Guided missiles (Surface-to-surface), Air Force, Reliability, Management engineering, Design, Data, Ground support equipment, Guided missile launching.

This document establishes the technical data and drawing requirements to be submitted by the System Integration Associate Contractor for the WS-133A Minuteman Weapon System. For convenience, the requirements specified herein have been related to the applicable item or items of the definitive contract AF04(647)-289. (Author)

AD-419 381 Div. 12, 13, 8, 5
OTS price $5.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN),
by G. W. Greene. 9 Oct 63, 48p. Rept. no. MPO SR17 300
Contract AF04 694 261
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Launching sites), (*Guided missiles, Ground support equipment), Launching, Control systems, Electronic equipment, Guided missile personnel, Buildings, Antennas, Communication systems, Monitors, Radio equipment, Power supplies, Batteries & components, Strategic weapons.

Contents: Introduction, Launch Control Center, Launch Control Equipment Building, Access Facility, Launch Control Support Building, Launcher Equipment Room, Launcher Equipment Building, LF-LCF Antenna Farms.

AD-419 467 Div. 12, 30
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
ORBIT DETERMINATION ERROR ANALYSIS,
by D. R. Speece. Aug 63, 31p. Rept. no. TDR269 4110 3
Contract AF04 695 269
SSD TDR63 201 Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), Radar tracking, Position finding, Mathematical prediction, Height finding, Flight paths, Ranges distance, Measurement, Errors, Earth models, Statistical analysis, Digital computers, Determination.

The problem of orbit determination by radar tracking data is broken into its constituent parts, which are then subjected to detailed examination. Typical results are presented and discussed as a method of arriving at general conclusions. The behavior of orbital errors is interpreted in terms of the influence of their sources and the nature of their propagation. The emphasis of this analysis is on why orbital errors behave as they do, how well can we expect to determine orbits, and how can we do better. The conclusions are based on the results of a large number of digital simulations with the Aerospace TRACE program and the General Electric Pat-B program, plus limited experience in the reduction of ''live'' data from the SCF net. (Author)

AD-419 490 Div. 12, 8
OTS price $9.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
SEQUENTIAL RELIABILITY TESTS APPLIED TO CHECK-

OUT EQUIPMENT,
by Ben Norman Theall. Aug 63, 91p.
AFIT GRE ME63 7 Unclassified report

Master's thesis.

Descriptors: (*Reliability, Test methods), (*Checkout equipment, Reliability), Tables, Failure mechanics, Reliability (Electronics), Mathematical prediction, Ground support equipment, Sampling, Costs, Curve fitting, Probability, Life expectancy.

Efforts were directed toward discussing the need for reliability test of mission support aerospace ground equipment (AGE) such as checkout equipment. The discussions are aimed primarily at the sequential probability ratio (SPR) test for mean time between failure (termed T in this paper) determination when the distribution of failures can be assumed exponential. Other distributions are only mentioned. No specific checkout equipment is considered. Summary tables and charts are included in several areas in the hope that they will prove useful in practice for selecting an acceptable SPR test. The following subjects are discussed: considerations in setting acceptable test risks, conditions under which SPR tests are appropriate, the theory of SPR tests and the resulting relationships used in SPR tests of T, and the expected qualitative variations in an SPR test when different test parameters are varied. (Author) (U)

AD-419 598 Div. 12
OTS price $7.60

Boeing Co., Seattle, Wash.
QUALIFICATION PROGRAM AND STATUS REPORT, MINUTEMAN WEAPON SYSTEM,
by R. C. Hyslop and K. R. Seal. 13 Dec 62, 147p.
Document no. D2 14875
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Management engineering), (*Management engineering, Guided missiles (Surface-to-surface)), Air Force, Guidance, Control systems, Communication systems, Power supplies, Safety, Arming devices.

AD-419 600 Div. 12
OTS price $1.60

Martin-Marietta Corp., Orlando, Fla.
SCIENTIFIC PASSENGER POD ADDENDUM TO ANNEX FLIGHT TEST DIRECTIVE MISSILE N-25.
3 Oct 63, 11p.
Unclassified report

Report on Proj. TITAN.

Descriptors: (*Guided missiles (Surface-to-surface), Jettisonable equipment), Air Force, Electron density, Electrons, Temperature, Exhaust gases, Instrumentation, Magnetic tape, Recording systems, Data processing, Guided missile trajectories, Ejection, Scientific research, Telemeter systems, Spin, Tumbling, Airframes, Guided missile components, Attachment, Test vehicles, Test equipment.

The flight preparations and flight test of the scientific passenger pod carried on Missile N-25 will be conducted following the requirements established by the Annex Flight Test Directive Missile N-25. This document was prepared by the Martin Company in accordance with paragraph 3.3.2.2 of BMS-TII-CD-71000 Titan II Data Requirements Specifications. (Author)

AD-419 661 Div. 12, 26
OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - FTM 4379 MODEL SPECIFICATION S-133-1000-0-1,
by Robert J. Hemmestad. 17 Sep 63, 26p. D2 3929 437
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Specifications), Guided missile components, Acceptability, Production, Procurement, Configuration, Quality control, Visual inspection, Tables, Strategic weapons.

The purpose of D2-3929 is to document an Acceptance Summary Report for flight test missiles as required to support final acceptance activities at the Boeing Test Site. It provides evidence of missile configuration, identification and certification. It defines deviations from compliance with the Airborne Vehicle Model Specification, S-133-1000-0-1. This Document contains waivers and deviations granted by Air Force Ballistic System Division/Space Technology Laboratories. (Author)

AD-419 664 Div. 12, 26
OTS price $4.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FLIGHT TEST MISSILE 447, MODEL SPECIFICATION S-133-1007C,
by Carl J. Lish. 17 Sep 63, 1v. D2 10889 1, Vol. 59
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Quality control), (*Guided missile components, Specifications), Procurement, Acceptability, Configuration, Instrumentation, Mechanical drawings, Tests, Malfunctions, Military requirements, Visual inspection, Test equipment, Calibration.

13. INSTALLATIONS AND CONSTRUCTION

AD-419 022 Div. 13, 25
OTS price $8.60

Air Force Inst. of Tech., Wright- patterson Air Force Base, Ohio
DETERMINATION OF THE SIZE DISTRIBUTION OF AEROSOLS COLLECTED BY ELECTROSTATIC PRECIPITATION,
by Anthony Joseph Chiota, May 63, 83p.
AFIT GNE PHS 63 5 Unclassified report

Masters thesis.

Descriptors: (*Aerosols, Electrostatic precipitation), (*Electrostatic precipitation, Radioactive fallout), (*Samplers, Radioactive fallout), Particle size, Radioactivity, Radioactive fallout, Scattering, Instrumentation, Atmosphere, Microscopy.

An electrostatic airborne radioactivity collector (EARC-I) is analyzed to determine what correlation exists between the manner in which it actually collects atmospheric aerosols and the theoretical model previously established. Size-distributions of aerosols with radii in the range of

1.0 to 10.0 microns are determined by optical microscopic analysis of particulate matter collected at nine locations along the collection plates of the precipitator. Theoretical size-distributions are calculated for the same locations based on the IBM 7090 solution of theoretical equations describing the charging processes in EARC-I. It is concluded that EARC-I does collect particles roughly in accordance with the theoretical model. (Author)

AD-419 288 Div. 13
OTS price $7.60

Corps of Engineers, Washington, D. C.
PLUMBING AND GASFITTING - EMERGENCY CONSTRUCTION.
31 Jan 63, 1v.
CE EM1110 345 556 Unclassified report

Descriptors: (*Sanitary engineering, Standards), (*Pipe fittings, Gases), (*Pipes, Water), Compressed air, Mechanical drawings, Water supplies, Heaters, Design, Analysis, Gas flow, Buildings.

This manual prescribes the standards of emergency construction to be used by all elements of the Corps of Engineers for the design of interior plumbing, gas, and compressed-air systems in buildings. (Author)

AD-419 289 Div. 13
OTS price $7.60

Corps of Engineers, Washington, D. C.
WATER SUPPLY-EMERGENCY CONSTRUCTION.
1 Mar 63, 1v.
CE EM1110 345 515 Unclassified report

Descriptors: (*Water supplies, Handbooks), Water, Fires, Storage, Distribution, Sources, Chemical analysis, Water softeners, Corrosion inhibition, Water tanks, Pressure, Chlorine, Sanitary engineering, Purification.

Contents: Water sources; Methods for special water treatment; Water-storage tank; Distribution system; Chlorination of water supplies.

AD-419 291 Div. 13
OTS price $1.10

Corps of Engineers, Washington, D. C.
MECHANICAL REFRIGERATION AND VENTILATION IN COLD-STORAGE FACILITIES.
20 June 61, 6p.
CE EM1110 345 163 Unclassified report

Descriptors: (*Refrigeration systems, Ventilation), (*Ventilation, Refrigeration systems), Meat, Storage, Water supplies, Design.

AD-419 365 Div. 13
OTS price $2.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PERFORMANCE TEST OF FEASIBILITY MODEL AIR-COOLED, 6,000-BTU/HR, THERMOELECTRIC AIR CONDITIONER, by Claude M. Trocme. 8 Feb 63, 23p.
Task 8F71 11 001 03
AERDL TR1738 Unclassified report

Descriptors: (*Air conditioning equipment, Thermoelectricity), Air cooled, Feasibility studies, Performance tests.

A performance test is presented of a feasibility model 6,000-Btu/hr, air-cooled, thermoelectric air conditioner (T. E. A. C.). The purpose of the test was to determine the performance of the air conditioner under various conditions and to reveal any new factors which should be investigated in a further study of thermoelectric air conditioning. The air conditioner is an air-to-air, thermoelectric prototype designed to produce approximately 6,000 Btu/hr of sensible cooling at 110 F ambient with cold air entering at 90 F. The air conditioner is shaped so that it can be mounted flush within a wall. Eight Rotron 341 QS fans circulate the hot air and twelve Rotron 35 QA fans circulate the cold air. The height of the air conditioner is 34-3/4 in., its width is 23-1/8 in., the overall thickness is 11-7/8 in., and the thickness without the fan housings is 3-3/4 in. The total volume is 2.4 ft and the weight is 85 lb. (Author)

AD-419 472 Div. 13, 15
OTS price $1.60

Harvard U., Div. of Engineering and Applied Physics, Cambridge, Mass.
ANALYSIS OF A STRUCTURE WITH A RANDOM GEOMETRY, by J. Lyell Sanders Jr. Apr 63, 10p. Technical rept. no. 16
Contract Nonr1866 02
Unclassified report

Descriptors: (*Structures, Geometry), (*Mathematical analysis, Structures), Beams (Structural), Foundations (Structural), Probability, Statistical functions, Integral equations, Difference equations, Differential equations, Integral transforms, Bessel functions, Partial differential equations.

A metal polycrystal, a nonwoven fabric such as felt, a suspension of particles of random size, shape, and location in a viscous fluid, are examples of what we mean by a structure with a random geometry. The problem of interest in connection with such structures is the determination of some average property such as the effective Young's modulus or the effective viscosity or perhaps the probability density function of these properties. Solutions satisfactory for practical purposes to a fair number of such problems have appeared in the literature, but the author knows of no instance in which some (nontrivial) average property of a random structure has been determined exactly. The difficulty is not in solving some known mathematical equation, but rather in reducing such problems to exact mathematical terms. In order to become better acquainted with the nature of the problem, an exact analysis of a very simple random structure is presented. The analysis of a structure which is essentially one-dimensional is undertaken. It turns out that the analysis of this structure is much like the analysis of a Markov process. (Author)

AD-419 518 Div. 13, 17, 20, 26
OTS price $11.00

Advance Research, Inc., Cleveland, Ohio.
CRITICAL INDUSTRY REPAIR ANALYSIS, STEEL INDUSTRY.
Final rept.
1963, 1v.
Contract OCD OS62 257, Subtask 3311A
Unclassified report

Descriptors: (*Steel industry, Nuclear explosion damage), (*Nuclear explosion damage, Steel industry), Nuclear explosions, Coal, Ores (Metal sources), Limestone, Processing, Damage,

Blast furnace, Gases, Oxygen, Air, Steel, Ventilation, Electric power production, Production, Radioactive fallout, Vulnerability, Damage control, Blast, Data, Explosion effects, Industrial production.

This study presents a comprehensive analysis of the relation of the processing environment and vulnerability of representative raw-material and iron/steel-producing facilities in a critical steel complex to repair and recovery from the effects of thermonuclear attacks. The scope includes special attention to salient bottlenecks in the operation and flow of the process from basic raw materials through finished production. Significant potential damage, general repair considerations, and production operations were studied at a large steel complex on the Ohio River in western Pennsylvania; raw materials were studied at the installations of some suppliers of this plant. The processing of the three primary raw materials, coal, ore, and limestone, has been treated both as part of the complex and as a separate entity from the standpoint of potential damage. (Author)

AD-419 529 Div. 13, 20
OTS price $2.60

Factory Mutual Research Corp., Norwood, Mass.
THE SUSCEPTIBILITY OF EXISTING NAVAL BUILDINGS TO SUSTAINED FIRES RESULTING FROM THERMAL PULSE FROM THE EXPLOSION OF NUCLEAR WEAPONS.
Final rept. on Phase I,
by E. W. Cousins and J. R. Young. 2 Apr 62, 21p.
Contract NBy37596
Unclassified report

Descriptors: (*Naval shore establishments, Fires), (*Buildings, Fires), (*Fires, Nuclear explosions), (*Nuclear explosions, Fires), Thermal radiation, Combustion, Wood, Asphalt, Plastics, Tar, Blackbody radiation, Steel, Concrete, Brick, Combustion.

A study was made to determine if Navy buildings outside the area of significant blast damage are susceptible to ignition and sustained burning due to primary thermal radiation. From consolidation of fire protection experience with weapons effects data, and published ignition data, it is concluded that beyond the area of significant blast damage there is little likelihood that sudden conflagration would involve existing Navy buildings following nuclear attack, if there are no kindling fuels. However, there would be need for the immediate searching out and extinguishing of isolated incidences of glowing and flaming combustion, both interior and exterior. (Author)

AD-419 593 Div. 13
OTS price $5.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
DEVELOPMENT OF GLACIER SUBSURFACE WATER SUPPLY AND SEWAGE SYSTEMS.
Rept. for Apr 58-Sep 61,
by Raul Rodriguez. 8 Feb 63, 48p. Technical rept. no. 1737TR
Projs. 8S66 02 005 and 8S66 02 001, Task 8S66 02 001 03
Unclassified report

Descriptors: (*Sanitary engineering, Polar regions), (*Water supplies, Glaciers), Sewage, Army research, Feasibility studies, Snow, Shafts, Hydrostatics, Ice, Storage, Military engineering, Costs, Drilling machines.

Report summarizes data obtained by Sanitary Sciences Br, USAERDL, on development studies of glacier subsurface water supply and sewage systems. Report concludes that: (a) Drinking water can be obtained from glacier subsurface sources more economically and efficiently than from surface snow melting, and water produced is normally not contaminated and is acceptable without further treatment. (b) Glacier subsurface wells can be used as heat sinks for dissipation of waste heat of nuclear reactors. (c) Subsurface cavities which are no longer used for obtaining water can be used for storage of supplies and fuels and for disposal of waste products including low-activity waste water from nuclear reactors. (d) The equipment installation and operating procedures contained in Appendix B of this report are a simplified design for future glacial water supply systems using subsurface wells. (e) Discharge of sewage into subsurface of glacier is an economical and reliable method for disposal of liquid wastes. (Author)

14. MATERIALS (NON-METALLIC)

AD-419 128 Div. 14
OTS Price $11.50

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
THE TRIAXIAL TENSION FAILURE OF VISCOELASTIC MATERIALS.
Interim rept., 1 Jan-31 Dec 62
by G. H. Lindsey, R. A. Schapery, M. L. Williams and A. R. Zak. Sep 63 148p.
Contract AF33 616 8399, Proj. 7063, Task 7063 02
ARL 63 152 Unclassified report

Descriptors: (*Isocyanate plastics, Viscoelasticity), (*Viscoelasticity, Isocyanate plastics), (*Failure (mechanics), Isocyanate plastics), Test equipment, Test method, Time, Temperature, Stresses, Fracture (mechanics), Strain (mechanics), Shear stresses, Equations, Tensile properties, Compressive properties.

After reviewing present work in failure criteria for various stress states, this report presents both an analytical and theoretical study of triaxial failure of polymeric materials. The configuration chosen for the investigation is a thin, circular, disk-like specimen that is bonded between rigid, cylindrical bars and pulled parallel to its longitudinal axis. Using the minimum potential energy principle, a stability criterion for catastrophic fracture for spherical voids is made, including details of local stresses and strains at the point of fracture, for finite as well as infinitesimal strains. Preliminary correlations of these results with more general failure theories including strain rate and temperature effects for uniaxial and biaxial stress states are indicated. (Author)

AD-419 158 Div. 14
OTS price $1.10

Aerojet-General Corp., Sacramento, Calif.
RESEARCH AND DEVELOPMENT IN SUPPORT OF THE POLARIS PROGRAM. TASK V. DEVELOPMENT OF HIGH STRENGTH IMPREGNATED ROVING FOR FILAMENT WINDING.
Bimonthly rept. no. 2, 10 June-9 Aug 63.
30 Sep 63, 3p. Rept. no. 0627V2
Contract NOw63 0627c
Unclassified report

Descriptors: (*Glass textiles, Filament wound construction), (*Filament wound construction, Glass textiles), Impregnation, Procurement.

AD-419 255 Div. 14
OTS price $2.60

Rutgers U., School of Ceramics, New Brunswick, N. J.
DEVELOPMENT OF REFRACTORY CERAMICS THAT CAN BE PROCESSED AT TEMPERATURES CONSIDERABLY LOWER THAN THEIR MAXIMUM USE TEMPERATURE.
Progress rept. no. 5, 1 Apr-1 July 63.
1 Sep 63, 23p.
Contract NOw62 0710d
Unclassified report

Descriptors: (*Ceramic materials, Sintering), (*Refractory materials, Sintering), (*Magnesium compounds, Sintering), (*Aluminum compounds, Sintering), Oxides, Silicon compounds, Density, Moisture, Absorption, X-ray diffraction analysis, Thermal expansion, Hydrogen, Helium, Controlled atmospheres.

Cordierite compositions were prepared utilizing the fritted composition as the basic raw material. Density, moisture absorption, X-ray determinations, thermal expansion, and transverse strength results are shown. A study of the densification of six compositions in the alumina magnesia system was carried out in vacuum, dry hydrogen and dry helium. The compositions range from pure alumina at one end to a 2.0% magnesia content at the other end. Density and moisture absorptions are shown as a function of the composition and firing atmosphere. (Author)

AD-419 399 Div. 14, 30
OTS price $3.50

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
DIRECTORY IN PLASTICS, KNOWLEDGEABLE GOVERNMENT PERSONNEL,
by Norman E. Beach. Apr 63, 248p. Rept. no. 5A
Unclassified report

Descriptors: (*Plastics, Directories), (*Directories, Plastics), Department of Defense, Air Force, Army, Coast Guard, Navy, Engineering personnel, Government employees, Military personnel, Personnel, Professional personnel, Scientific personnel, Scientific research, Indexes, Subject indexing, Materials.

This document is a revision of PLASTEC Report 5, ''Technical Resources Directory in Plastics,'' issued in 1961 at the direction of the Office of the Director of Defense Research and Engineering. The aim of that document was to provide a means for the rapid identification and contacting of those personnel within the Department of Defense who are knowledgeable in the various areas of plastics development, manufacture, and uses. Contributions from 94 activities are presented, covering some 700 persons who are variously specialized in subjects pertaining to the plastics field. An index of personnel is included for use in the locating of a person known by name only. A listing of subjects, cross-referenced to the specializing activity, is provided for the rapid location of personnel knowledgeable in a particular matter. This listing covers 485 primary subjects, many of which are further segmented. (Author)

AD-419 402 Div. 14
OTS price $1.50

Ordnance Research Lab., Pennsylvania State U., University Park.
THE EFFECTS OF SHELL JOINTS AND BONDING ON THE STABILITY OF ACRYLIC RESIN CELLULAR SHELLS,
by J. D. Stachiw. 25 Sep 63, 6p. Serial no. NOrd16597 97
Contract NOrd16597
Unclassified report

Descriptors: (*Acrylic resins, Cylindrical bodies), (*Cylindrical bodies, Acrylic resins), Buckling (Mechanics), Elasticity, Stresses, Epoxy plastics, Models (Simulations), Pressure, Tests, Photoelasticity, Joints, Compressive properties, Underwater equipment, Experimental data, Theory, Bonding, Strain (Mechanics), Hydrostatic pressure, Geometric forms, Rings, Stability.

Six acrylic resin cellular shells were tested under external hydrostatic pressure to determine the effects of joints between individual shell structure components and the effects of bonding on cellular shell stability. When the shell stiffeners were restrained from moving laterally, the location of joints and the degree of bonding did not affect the general elastic stability enough to cause failure by elastic buckling. All shells failed by material yielding except the one in which the stiffeners were not restrained from moving laterally. However, the distribution of stresses and strains on the other shell surfaces was considerably influenced by the location of joints and the degree of bonding. The shell stresses were calculated by Pulos' and Mehta's formulas and compared with the experimentally determined stresses. The calculated and experimental values agreed within ±15 per cent except for the principal axial stresses on the shell facings at the stiffeners. (Author)

AD-419 447 Div. 14
OTS price $.75

Rock Island Arsenal Lab., Ill.
TRANSPARENT COMPOSITE PLASTIC FILMS FOR MILITARY PACKAGING,
by L. W. Lynch. 26 July 63, 19p.
Proj. 1H O 24401A110 05
RIAL Rept. no. 63 2482 Unclassified report

Descriptors: (*Films, Packaging materials), (*Plastics, Films), (*Composite materials, Films), Mechanical properties, Adhesives, Tensile properties, Permeability, Moisture-proofing, Greases, Heat resistant plastics, Laminated plastics, Thermal plastics.

Selected properties of significance to military packaging were determined on thirty-five single and thirty-five composite plastic films. Twenty-five of the composite films were fabricated in the Laboratory using commercially available adhesives as the bonding agents. Each of the thirty-five individual films was included in one or more composites. Properties tested include; tensile strength, yield strength, elongation, tearing strength, puncture resistance, blocking, grease resistance and moisture vapor transmission rates. Almost any property desired is available in plastic films but no single film incorporates all of the features desired for most military packaging applications. (Author)

AD-419 583 Div. 14, 9
OTS price $10.10

Plastics Lab., Princeton U., N. J.
THE DEFORMATION MECHANISMS IN BRANCHED POLYETHYLENE MELTS,
by James C. Galt and Bryce Maxwell. 31 Aug 62, 1v. Plastics Lab. technical rept. no. 66C
Contract DA31 124ARO(D)21
Unclassified report

Descriptors: (*Polyethylene plastics, Deformation), (*Polymers, Fluid flow), (*Viscoelasticity, Polyethylene plastics), Capillary tubes, Velocity, Molecular structure, Measurements, Viscosity, Melting, Shear stresses.

An experimental program has been undertaken to determine the point to point response to stress of a high polymer above its crystalline melting point. From these observations, the actual velocity profiles for branched polyethylene melts in a capillary have been obtained. Velocity within the capillary depends not only on the location of the point of interest but also on which representative infinitessimal element of the melt is under consideration. At the wall, both zero and non-zero velocities are found and the fluid elements may change velocity. At all points a large amount of variation is noted in velocities recorded at a given radius. The stick-slip at the wall is shown to be caused by melt elasticity. A boundary annulus is found next to the wall. A plug of elastically-strained structure is found at the centerline of the capillary. The shear annulus is the region between the plug and the boundary annulus. (Author)

AD-419 626 Div. 14
OTS price $1.60

Bendix Products Div., Bendix Corp., South Bend, Ind.
STRENGTHENING OF CHROMIUM-MAGNESIA COMPOSITES.
Interim rept. no. 2, 1 Apr-31 May 63,
by G. C. Reed. 14 June 63, 13p.
Contract N600 19 59647
AEC NP12973 Unclassified report

Descriptors: (*Composite materials, Materials), (*Chromium alloys, Composite materials), (*Magnesium compounds, Composite materials), Oxides, Tensile properties, Ceramic materials, Extrusion, Impact shock, Ductility, Microstructure.

This report describes the work accomplished during the second bi-monthly period of a program aimed at strengthening chromium-ceramic composites by alloying. During the previous reporting period, the notch tensile properties of Chrome-30 were evaluated at several stress concentration levels. Extrusions were prepared for evaluation of several compositional and processing variables aimed at improving ductility prior to initiation of the alloying study. The impact and tensile properties exhibited by these extrusions have now been determined. Pertinent chemical analyses are also reported. The best improvements were obtained by reducing the magnesia content. The compound containing three weight percent magnesia exhibited 45% tensile elongation at room temperature. It was decided that these results warranted further study before starting the alloy phase of this program. Four billets representing other low magnesia percentages have been prepared for this purpose. (Author)

AD-419 668 Div. 14, 25
OTS price $4.60

Plastics Lab., Princeton, N. J.
MOLECULAR STRUCTURE PARAMETERS IN CERTAIN SEMICONDUCTING POLYMERS,
by J. H. T. Kho and C. Cappas. 15 June 63, 41p.
Technical rept. no. 67B
Contract DA31 124AROD21, Proj. NR356 375
Unclassified report

Descriptors: (*Semiconductors, Organic compounds), (*Organic compounds, Semiconductors) (*Polymers, Semiconductors), Polycyclic compounds, Pressure, Temperature, Copolymerization, Impurities, Thermoelectricity, Resistance (Electrical), Aromatic compounds, Organic nitrogen compounds, Electrons, Spin, Lithium, Molecular structure, Metalorganic compounds, Energy, Materials, Carbonyl group.

Three series of highly conjugated PAQR semiconducting polymers were synthesized and their electronic behavior studied. The effects of the following variables on the electrical properties of the PAQR polymers were examined: Hydrocarbon portion of the polymers; Acidic portion of the polymers; Copolymerization and mole ratio of starting monomers; Metallic salt formation; Pressure and temperature. (Author)

15. MATHEMATICS

AD-419 063 Div. 15
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
TCHEBYCHEFF APPROXIMATION AND RELATED EXTREMAL PROBLEMS,
by E. W. Cheney and A. A. Goldstein. Aug 63, 24p.
Mathematical note no. 318; Rept. no. D1 82 0293
Unclassified report

Also available from the author.

Descriptors: (*Topology, Theory), Complex variables, Convex sets, Inequalities, Operators (Mathematics), Control.

AD-419 200 Div. 15
OTS price $2.60

Mitre Corp., Bedford, Mass.
THE POLYHEDRON AS A SWITCHING CONCEPT,
by P. G. Edwards. Sep 63, 24p. Rept. no. W5905
Contract AF19 628 2390, Proj. 600
ESD TDR63 439 Unclassified report

Descriptors: (*Geometric forms, Analysis), Geometry, Tables, Combinatorial analysis.

A preliminary evaluation is presented of two of the regular polyhedra, the icosahedron and the dodecahedron, and modification thereof, as possible configurations for a survivable switching network concept, involving two interconnected rings of switching points. (Author)

AD-419 370 Div. 15, 30
OTS price $1.10

Washington U., Seattle.
AN IBM TYPE 650 PROGRAM FOR TRANSFORMING A CORRELATION MATRIX TO BE ORTHOGONAL TO A NORMALIZED VECTOR,
by George R. Burket. Feb 60, 7p.
Contract Nonr47708; Grant M743C4
Unclassified report

Descriptors: (*Matrix algebra, Programming languages), Numerical methods and procedures, Vector analysis, Transformations (Mathematics), Correlation techniques, Punched cards, Control sequences, Equations, Data storage systems, Digital computers, Programming (Computers).

This program, given a correlation matrix and a normalized vector of the same order, obtains a

transformed correlation matrix whose rows, columns, and principal axis vectors are orthogonal to the given vector. The program first performs an iteration procedure to obtain a vector necessary for the transformation; the transformation itself is then carried out. In some cases there is no real solution to the problem, and the program stops while trying to take the square root of a negative number. The actual mathematical steps performed by the program are given in the Appendix. (Author)

AD-419 392 Div. 15
OTS price $3.60

RAND Corp., Santa Monica, Calif.
SOME TYPES OF OPTIMAL CONTROL OF STOCHASTIC SYSTEMS,
by Stuart E. Dreyfus. July 63, 29p.
Memo RM3726PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Stochastic processes, Control systems), Optimization, Feedback, Probability, Differential equations, Dynamic programming, Function, Taylor's series, Partial differential equations, Operators (Mathematics), Equations, Series, Integrals.

The optimal control of stochastic systems is considered. Under various assumptions concerning the information available to the controller, different optimal control rules result. For certain specific problems, the different control schemes are analyzed and compared, and the vast superiority of feedback over open-loop control is demonstrated. (Author)

AD-419 503 Div. 15
OTS price $8.60

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
SYNTHESIS OF VARIABLE ACTIVE NETWORKS,
by J. S. Thorp. Sep 62, 93p. Research rept. no. EE536; Technical rept. no. 73
Contract DA36 039sc85272
Unclassified report

Descriptors: (*Networks, Synthesis), Linear systems, Functions, Numerical analysis, Equations, Special functions, Transformations (Mathematics), Polynomials, Monte Carlo methods, Probability, Integral equations, Correlators, Signals, Fourier analysis.

The synthesis of variable active networks is investigated in order to obtain a common background for the study of variable and self-optimizing systems. The networks studied have a frequency or time response that is a function of an independent variable, which is assumed to vary sufficiently slowly with time that the systems can be considered to be time invariant. The only variable elements considered in the study are variable controlled sources. The sufficiency of fixed passive and variable active elements is demonstrated for transfer functions with numerator at least one degree less than denominator in s, the complex frequency. These functions are assumed to be rational in s for fixed x, the independent variable, but arbitrary functions of x. (Author)

AD-419 572 Div. 15, 30
OTS price $6.60

Naval Research Lab., Washington, D. C.
A DIGITAL COMPUTER PROGRAM IN NAREC CODE FOR CALCULATING PROLATE RADIAL SPHEROIDAL WAVE FUNCTIONS.
Interim rept.,
by S. Hanish. 10 July 63, 60p.
Proj. RF001 03 44 4052
NRL 5947 Unclassified report

Descriptors: (*Special functions, Analysis), (*Programming (Computers), Digital computers), Coding, Bessel functions, Series, Differential equations, Transformations (Mathematics), Potential theory, Magnetic tape, Programming languages, Control sequences.

The numerical computation of prolate radial spheroidal wave functions of the first and second type and their derivatives as defined by Morse and Feshback (''Methods of Theoretical Physics,'' Vol. II, page 1505, McGraw-Hill, 1953) in series of spherical Bessel and spherical Neumann functions has been coded for the NAREC (the high-speed digital computer at the Naval Research Laboratory). Following a brief review of the pertinent theory the author presents the complete digital computer program and explains the meaning of individual commands and blocks of commands in detail. The coded program in action accepts a read-in of the following parameters: the prolate spheroidal wave function expansion constants (calculated by a special coded program found in Hanish and Baier, ''A Digital Computer Program for Calculating Spheroidal Wave Function Eigenvalues and Expansion Constants,'' NRL Report 5837, Jan. 31, 1963), the modal numbers m and l, the radial coordinate Xi, the eccentricity parameter h, and the total number of terms to be summed in the several series. (Author)

AD-419 575 Div. 15, 25
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE EVALUATION OF SOME DEFINITE INTEGRALS INVOLVING BESSEL FUNCTIONS WHICH OCCUR IN HYDRODYNAMICS AND ELASTICITY,
by A. H. Van Tuyl. 21 Aug 63, 24p. Mathematics dept. rept. M39
NOL TR63 192 Unclassified report

Descriptors: (*Bessel functions, Integrals), (*Integrals, Fluid mechanics), Incompressible flow, Hydrodynamics, Elasticity, Functions, Complex numbers, Complex variables, Equations, Partial differential equations, Special functions, Integration.

The integrals I sub 1(m, nu) = integral evaluated from 0 to infinity of -xt power of e J sub nu (yt) J sub nu (bt) m power of t dt and I sub 2 (m, nu) = integral evaluated from 0 to infinity of -xt power of e J sub nu-1 (yt) J sub nu (bt) m+1 power of t dt are considered, where x,y, and b are complex. Results are given for the evaluation of I sub 1 (m, nu) and I sub 2 (m, nu) in terms of associated Legendre functions of the second kind when m is greater than or equals 0 and nu is complex, and for the evaluation of I sub 1 (m,n) and I sub 2 (m,n) in terms of elliptic integrals when n greater than or equal to 0 is an integer. Recurrence relations are given for the calculation of I sub 1 (m,n) and I sub 2 (m,n) when I sub 1 (m,n) is known for certain values of m and n. (Author)

AD-419 609 Div. 15, 30, 12
OTS price $3.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
MATHEMATICAL MODELS FOR SYSTEM ANALYSIS,

by Larry D. Krull. Aug 63, 31p.
AFIT GRE ME63 3 Unclassified report

Master's thesis.

Descriptors: (*Mathematical models, Weapon systems), (*Guided missile models, Simulation), Stochastic processes, Differential equations, Probability, Functions, Integral equations, Analog computers, Guided missiles simulators, Failure (Mechanical), Maintenance, Time, Integrators (Computers).

An important phase of systems engineering is the development and use of mathematical models for systems analysis. The modeling of systems which can be considered stochastic in nature has wide application for system analysis. If a system is made up of operational units and repair channels, having respectively, time dependent failure rates and time dependent repair rates its basic mathematical model can be written as a differential equation. The application of this model to a system will result in a system of differential equations representing the particular system model. In order to arrive at the transient and steady-state solution of this model directly, analog computer simulation can be used. The use of stochastic modeling and analog simulation results in data which has definite and varied application for system analysis from both the technical and economic aspects. (Author)

AD-419 611 Div. 15
OTS price $4.60

Michigan U., Coll. of Literature, Science and the Arts, Ann Arbor.
NORMAL MONOIDS AND FACTOR MONOIDS OF COMMUTATIVE MONOIDS,
by Yehoshafat Give'on. May 63, 37p. 05662, 03105 25T
Contracts Nonr1224 21 and DA31 124ARO D G433, ORA Projs. 03105 and 05662
Unclassified report

Descriptors: (*Algebras, Theory), (*Groups, Theory), Topology, Operators (Mathematics), Transformations (Mathematics), Number theory, Equations, Automation.

Certain properties of commutative monoids are discussed; some of them are directly relevant to the theory of commutative automata. In particular, interest is in finitely generated monoids and in finite factor monoids. At the beginning there is a study of three closure operations on submonoids of a commutative monoid which provides tools for the study of factor monoids. Some properties of factor monoids and give certain conditions for finite factor monoids are discussed. The proof that those closure operations lead to finitely generated monoids when they are applied on any submonoid of any finitely generated free commutative monoid concludes the matter. (Author)

AD-419 613 Div. 15, 30
OTS price $15.00

George Washington U., Washington, D. C.
SOME CONSIDERATIONS OF THE USE OF EXTREME POINT SOLUTIONS TO LINEAR INEQUALITY MODELS,
by Harry Jerome Bracken, Jr. 30 Sep 63, 1v.
Serial no. T159
Contracts Nonr 76103; Nonr76105 and Nonr76106, Proj. NR345 107, Proj. NR047 001 and Proj. NR347 008
Unclassified report

Descriptors: (*Mathematical models, Inequalities), (*Linear programming, Optimization), (*Management engineering, Analysis), Programming (Computers), Statistical analysis, Geometric forms, Statistical functions, Functions, Decision making, Effectiveness, Digital computers, Monte Carlo method, Simulation, Integrals, Tables.

Various aspects of the use of extreme point solutions to linear inequality models are considered. The primary topics considered are computation of all extreme point solutions of systems of linear inequalities, use of extreme point solutions in general analysis of administrative problems which are modeled by linear inequalities, and use of all extreme point solutions to investigate selected problems of linear programming under uncertainty. Several additional complementary topics are treated. (Author)

AD-419 679 Div. 15
OTS price $1.60

Israel Inst. of Tech., Haifa.
ON HOMOMORPHIC IMAGES OF TRANSITION GRAPHS,
by Michael Yoeli and Abraham Ginzburg. Apr 63, 10p. Technical rept. no. 11
Contract N62558 3510
Unclassified report

Descriptors: (*Transformations (Mathematics), Combinatorial analysis), Sequences, Series, Number theory, Groups (Mathematics).

A simple method is derived for obtaining all homomorphic images of a given complete or partial transition graph. This method consists of the successive application of elementary steps, corresponding to four types of 'elementary' congruences. Furthermore, it is shown that the number of elementary steps required to derive a given homomorphic image is constant, if the original transition graph is complete and connected. (Author)

16. MEDICAL SCIENCES

AD-419 007 Div. 16
OTS price $14.50

Maryland U, College Park.
INDEX CATALOGUE TO RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE IN MEDICAL ENTOMOLOGY. VOLUME II. TICKS,
1963, 213p.
Contract DA49 193MD 2238
Unclassified report

Descriptors: (*Bibliographies, Ticks), (*Ticks, Bibliographies), Arthropods, Medical research.

AD-419 066 Div. 16
OTS price $3.60

Applied Biological Sciences Lab. Inc., Glendale, Calif.
INVESTIGATION OF THE MECHANISM OF FIBRINOLYSIS.
Annual progress rept. 1 Jul 62-30 Jun 63,
by Joseph B. Michaelson. 30 Jun 63, 24p.
Contract DA49 193MD2209
Unclassified report

Descriptors: (*Pancreas, Enzymes), (*Enzymes, Ribonucleic acids), (*Fibrin, Bovines), Ribonuclease, Hydrolysis, Inhibition, Man, Biochemistry.

In in vitro studies bovine pancreatic ribonuclease has been found to inhibit the depolymerization and hydrolysis of bovine fibrin by plasmin of human origin. The human plasmin utilized was observed to enhance the nuclease enzyme activity of bovine pancreatic ribonuclease. Studies made on the role of heparin and ribonuclease in fibrinolysis have indicated that heparin inhibits the antiplasmin activity of ribonuclease. In addition, it has been found that heparin in low concentration (1 - 10 NIH units) induces liquefaction of fibrin clots in vitro without added plasmin. Bovine pancreatic ribonuclease will inhibit this effect of heparin. Dilute acid hydrolysis of bovine pancreatic ribonuclease (0.01N - 0.075N hydrochloric acid) results in the loss of the nuclease activity of ribonuclease but not the antiplasmin activity of ribonuclease. The data obtained are discussed in terms of the mechanism of fibrinolysis and the functions of ribonuclease and heparin. (Author)

AD-419 073 Div. 16
OTS price $1.60
Naval School of Aviation Medicine, Pensacola, Fla.
A LONGITUDINAL STUDY OF HEALTHY YOUNG MEN: CORRELATION COEFFICIENTS.
Research rept.
by Robert K. Osborne, William R. Harlan, Jr. and Aston Graybiel. 15 Jul 63, 9p. Rept. no. 7
Proj. MR005.13 3001
Unclassified report

Descriptors: (*Aviation medicine, Statistical data), (*Epidemiology, Pilots)., Blood pressure, Hypertension, Arteries, Necrois, Correlation techniques, Electrocardiography, Naval personnel.

A large body of data has been accumulated in a continuing epidemiological study of naval aviators. It was necessary to explore methods which would allow expression of important relationships which could be investigated further. An IBM 1620 computer has been used to construct a large matrix of correlation coefficients for this purpose. The relationships among data from three examinations conducted over a period of years on a group of healthy young men are presented in the form of correlation coefficients. A correlation matrix of 106 continuous variables is recorded as a reference for other investigators. Pertinent statistical considerations are outlined and briefly discussed. (Author)

AD-419 090 Div. 16
OTS price $2.60

North Carolina U. School of Public Health, Chapel Hill.
NUTRITIONAL REQUIREMENTS OF ENTEROTOXIGENIC STRAINS OF STAPHYLOCOCCUS AUREUS.
Annual progress rept., 1 Jan-1 Sep 63,
by Fritz T. Sulzer. 1 Sep 63, 16p.
Contract DA49 193md2374
Unclassified report

Descriptors: (*Staphylococcus, Nutrition), (*Nutrition, Staphylococcus), Culture media, Growth, Glucose, Inhibition, pH, Toxins and antitoxins, Microorganisms, Amino acids, Ammonium compounds.

The nutritional requirements for growth of four enterotoxigenic, two suspected enterotoxigenic, and two known non-enterotoxigenic strains of Staphylococcus aureus were investigated. In a synthetic medium containing glucose, ammonium sulfate, other inorganic salts, thiamine and nicotinic acid, the minimum amino acid requirement for all strains were arginine and cystine, or, in absence of ammonium ion, a combination of arginine, cystine and glycine. In glucose-free media, more amino acids were required, for some strains up to eight, viz. arginine, aspartic acid, cystine, glycine, valine, proline, histidine and phenylalanine. Good growth comparable to that in non-synthetic media was attained with these eight amino acids in presence of glucose. (Author)

AD-419 095 Div. 16
OTS price $3.60

Washington State U., Pullman.
QUARTERLY REPORT OF RESEARCH.
5 May 63, 37p.
Contract DA18 064 CML 2754
Unclassified report

Descriptors: (*Rusts (Microorganisms), Cold weather tests), (*Plants (Botany), Infections), Environmental tests, Fungi, Growth, Wheat, Anticrop agents.

The purpose of this quarterly report is to present the results of experiments made during each of two years in southeastern Washington on the winter behavior of Puccinia striiformis. More specifically, it is the intent of the investigators to present findings on research design (1) to determine when and under what environmental conditions infection occurs; (2) to determine under what environmental conditions overwintering can occur; and (3) to determine the fate of infections during the winter months. (Author)

AD-419 121 Div. 16, 29
OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGIC RESPONSE TO TRANSIENT HEAT STRESS

IN REFLECTIVE VERSUS NONREFLECTIVE CLOTHING.
Final rept., May 62-Mar 63,
by T. T. Kissen and J. F. Hall, Jr. Aug 63, 13p.
Proj. 7222, Task 722204
AMRL TDR63 79 Unclassified report

Descriptors: (*Heat, Tolerances (Physiology)), (*Clothing, Reflection), Exposure, Physiology, Aluminum, Stress (Physiology), Reflexes, Heart, Perspiration, Effectiveness, Blood pressure, Measurement, Thermal stresses, Skin.

Six subjects wearing either nonreflective or reflective outer garments of equal insulative value (1 clo) and unventilated were exposed in 96 experiments to heat pulses of 93 degrees, 121 degrees, 149 degrees, and 177 degrees C for 15, 12, 9, and 2 minutes, respectively. The experiments were designed to simulate a range of re-entry heat exposures produced by malfunction or failure of the air-conditioning system of the vehicle. Total experimental time included the heat pulse and subsequent recovery period and was constant (40 minutes) for all conditions. Mean weighted skin and rectal temperatures, heart rate, total sweat produced and evaporated, and cardiac-output, indirectly derived from blood pressure measurements, were the observed physiologic parameters. Evaluation of each parameter, individually, indicates that for some there is no relation between the physiologic response, the type of garment protection, and the level of thermal stress, while for others there is marginal benefit derived from wearing aluminized outer clothing. At only one time-intensity profile did the physiologic penalty of wearing nonreflective outer clothing appear more than marginal. However, even under the most severe conditions of thermal stress and absence of reflective protection, none of the physiologic responses approached tolerance limits in our terms of reference. (Author)

AD-419 138 Div. 16
OTS price $1.10

Army Medical Research and Nutrition Lab., Denver, Colo.
SUMMARY OF SIGNIFICANT FINDINGS BY SGO CONTRACTORS.
Summary rept., Sep 62-Mar 63.
1 Aug 63, 5p.
Unclassified report

Descriptors: (*Food, Radiation damage), (*Meat, Radiation effect), (*Radiation effect, Food), (*Vegetables, Radiation effect), Rats, Dogs, Primates, Thyroid gland, Beef, Fertility, Reproduction, Heart, Fruits, Seafood, Pathology, Histology, Nutrition.

AD-419 149 Div. 16
OTS price $1.60

Aerospace Medical Div., Air Force Systems Command, Brooks Air Force Base, Tex.
EFFECTS OF HIGH CONCENTRATIONS OF CARBON DIOXIDE AND DIET ON URINARY EXCRETION OF STEROIDS AND CATECHOLAMINES,
by Frode Ulvedal, R. G. Cutler and B. E. Welch.
Aug 63, 12p.
Task 793002
SAM TDR63 63 Unclassified report

Descriptors: (*Excretion, Steroids), (*Physiology, Pilots), (*Diet, Endocrine glands), Urinary system, Amines, Carbon dioxide, Epinephrine, Levarterenol, Hormones, Corticosteroid agents, High altitude, Stimulation.

Air Force pilots were exposed to inspired tracheal PCO2 of 21 mm. Hg (BTPS) at 700 mm. Hg and 200 mm. Hg cabin pressure. Each exposure was of 4 days' duration and was preceded in each case by a control period of low CO2 also of 4 days' duration at the equivalent cabin pressures. During the entire experiment, including pre- and post-experiment control periods, the subjects were given a special liquid diet. The effects of CO2 and diet on the endocrine functions were studied by determining the urinary excretion of epinephrine, norepinephrine, 17-OHCS, and corticosterone-like hormones. It was found that the CO2, both at ground and at simulated altitude, increased the excretion of epinephrine, norepinephrine, and corticosterone-like hormones. CO2 at simulated altitude had a stronger effect than at ground level. The special liquid diet caused increased excretion of epinephrine, while the excretion of the other three hormone groups decreased. (Author)

AD-419 150 Div. 16, 30
OTS price $1.60

Aerospace Medical Div. Air Force Systems Command, Brooks Air Force Base, Tex.
AN INSTRUMENT FOR MEASURING HORIZONTAL TOOTH MOBILITY,
by Timothy J. Oleary and Kenneth D. Rudd. Aug 63, 7p.
Task 775602
SAM TDR63 58 Unclassified report

Descriptors: (*Teeth, Motion), (*Dentistry, Instrumentation), Analysis, Measurement.

An instrument for measuring horizontal tooth mobility has been developed for use in clinical practice and in research. The instrument consists of a multijointed carrying vehicle which supports and allows proper positioning of a mechanical dial test indicator with recording point. The carrying vehicle is attached to the dental arches by a clutch with an extraoral female attachment. Analysis of the data obtained with the instrument showed that good reproducibility is obtained when measurements are made by trained investigators. Reproducibility was good on a group of subjects ranging widely as to periodontal status and age. It was not affected by removal and recementing of the apparatus. The mobility of a complement of 28 teeth can be measured in thirty-five to forty minutes. (Author)

AD-419 154 Div. 16, 20
OTS price $4.60

Hazleton-Nuclear Science Corp., Palo Alto, Calif.
HIGH SPECIFIC ACTIVITY LABELING OF INSULIN WITH IODINE-131.
Final technical rept., 1 Nov 62-1 Apr 63,
by Jefferson W. Davis. 1 Apr 63, 38p. HNS35
Contract DA49 193MD2367
Unclassified report

Descriptors: (*Insulin, Labeled substances), (*Iodine, Radioactive isotopes), Tracer studies, Purification, Chromatographic analysis, Preparation.

Two methods reported in the literature for the labeling of insulin with iodine-131 have been studied using tracer amounts of activity and the results described in this report. Although this study concerned itself with low specific activity insulin, the design of the apparatus and experimental techniques are such that high specific activity labeling may be achieved by scaling up with little modification. The two methods studied, one described by Yalow and Berson and the other by R. W. Helmkamp and associates, differ

essentially in the reagent used in the iodination, the former using iodine in basic solution and the latter iodine monochloride. Our studies seem to indicate that even when tracer amounts of radioactive iodine are used in the preparation of labeled insulin the degree of degradation is in excess of 25%. We have shown that there exists a great need for a better method of purification of labeled insulin, conventional techniques being inadequate. Of the several possibilities which suggest themselves, paper chromatography seems the most promising for further study. (Author)

AD-419 188 Div. 16
OTS price $1.10

School of Aerospace Medicine Brooks, Air Force Base, Tex.
THE ACUTE MAMMALIAN TOXICITY OF RARE EARTH NITRATES AND OXIDES,
by D. W. Bruce, B. E. Hiet brink and K. P. Dubois. Aug 63, 6p.
Contract AF41 609 1693 Task 583002
SAMB TDR63 38 Unclassified report

Descriptors: (*Rare earth compounds, Nitrates), (*Nitrates, Toxicity), Rats, Mice, Salts, Cerium, Lanthanum compounds, Praseodymium compounds, Neodymium compounds, Samarium compounds, Sex, Oxides, Biochemistry, Physiology.

Results of acute toxicity studies on rare earth nitrates indicate that their acute toxicity is highly dependent on the route of administration. The nitrate salts were moderately toxic when given intraperitoneally to rats and mice and only slightly toxic when administered orally to rats. With the exception of the transition elements, for which the oral LD50 values were greater than 5,000 mg./kg., the compounds generally exhibited an increase in toxicity with increasing atomic weight. The light lanthanons are highly toxic to rats by the intravenous route. The nitrate salts of cerium, praseodymium, neodymium, and samarium were from 7 to 11 times more toxic to females than to male rats. Erbium nitrate, a heavy lanthanon, did not show the marked sex difference in toxicity to rats. Rats were able to tolerate 1,000 mg./kg. of the rare earth oxides given orally or intraperitoneally. (Author)

AD-419 357 Div. 16, 28
OTS price $1.10

Harvard U. Medical School, Boston, Mass.
GROUP PROCESS UNDER DIFFERENT CONDITIONS OF SUCCESS AND FAILURE.
Annual rept. no. 3,
by David Shapiro. Oct 63, 7p.
Contract Nonr186643, Proj. NR170518
Unclassified report

Descriptors: (*Behavior, Psychology), (*Group dynamics, Psychology), (*Psychology, Group dynamics), Leadership, Sociology, Physiology, Psychiatry, Biology, Symposia.

AD-419 563 Div. 16
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
INDUCTION OF HOMOGRAFT TOLERANCE IN SUBLETHALLY X-IRRADIATED ADULT MICE,
by W. E. Davis and L. J. Cole. 19 Aug 63, 12p.
NRDL TR668 Unclassified report

Descriptors: (*Radiation effects, Immunology), (*X-rays, Transplantation), Mice, Spleen, Whole body irradiation, Bone marrow, Pathology, Tolerance (Physiology), Skin, Laboratory animals.

An attempt has been made to achieve homograft tolerance in sublethally irradiated adult mice under conditions which avoid secondary disease. Allogeneic mice which share the same H-2 locus, but differ at other histocompatibility loci, have now been used with some success. A tolerant state has been produced in CBA (H-2k) mice by first exposing them to sublethal X-radiation (500 rad) or urethan-treatment coupled with irradiation, and then injecting C3H (H-2k) spleen (18 x 10 to the 6th power) and/or bone marrow (42 x 10 to the 6th power) cells within 3 days post irradiation. These mice have retained subsequent C3H skin homografts (over 165 days) but have rejected BALB/c skin grafts (H-2d) within 33 days. On the other hand, irradiated and urethan-treated controls, uninjected or injected with X-ray inactivated (2000 rad in vitro) C3H cells, rejected both C3H and BALB/c homografts by 70 days. Similar results, although less definitive, have been obtained using C3H (Hd2k) or BALB/c (H-2d) as the recipient mice and CBA (H-2k) or DBA/2 (H-2d) mice respectively, for the donor cells. Such procedures, however, have been unsuccessful in producing homograft tolerance between donor and host F1 hybrid mice which have one H-2 histocompatibility locus in common but differ at the other. The significance of these results is discussed. (Author)

AD-419 604 Div. 16, 15
OTS price $6.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN ANALOG AND DIGITAL AUTOCORRELATION ANALYSIS OF A NORMAL EEG FOR VARYING ANALYTIC LENGTHS,
by Charles D. Van Ry. Aug 63, 57p.
AFIT Rept. no. GA EE63 2
Unclassified report

Master's thesis.

Descriptors: (*Electroencephalography, Correlation techniques), Communication theory.

Autocorrelation analysis, which has been used in statistical communication theory for the study of randomly varying processes, can be applied to electroencephalography--the study of brain waves. The statistical properties retained by an autocorrelation analysis of the EEG are summarized in the power density spectrum. The amplitude and frequency characteristics of this spectrum have been found to change with analytic length, denoting an inherent EEG statistical instability which limits the resolving power of the autocorrelation function. There are indications that this instability is a function of component power and frequency, and this information may be applicable to future investigations. (Author)

AD-419 628 Div. 16
OTS price $1.10

Army Medical Research Unit (Europe).
(No title).
Annual progress rept. 1 July 62-30 June 63. 30 June 63, 19p.
Proj. 6 x64 14 001, Task 6x64 14 001 04
Unclassified report

Descriptors: (*Whole body irradiation, Monitors), (*Cesium, Radioactive isotopes), Fats,

Adsorption, Fission products, Milk, Potassium, Radioactivity, Determination, Thyroid gland, Liver, Neoplasma, Radiation measurement systems.

Continued assays of normal persons in the Whole Body Counting Facility have revealed increased levels of radiocesium-137 during this fiscal year. Follow-up of patients with carcinoma of the thyroid has continued. Clinical studies concerning total body fat, fat adsorption and whole body potassium have been accomplished. A major renovation of the Whole Body Counting Facility was accomplished. Fission products determinations in both milk and rain samples were performed during the first half of the fiscal year. (Author)

17. METALLURGY

AD-419 008 Div. 17 26
OTS price $1.25

Brush Beryllium Co., Cleveland, Ohio
FABRICATION OF ULTRAFINE BERYLLIUM WIRE.
Final rept.
by E. A. Murphy and R. G. O'Rourke 1 Aug 63, 43p.
Technical rept. No. 318 240
Contract NOw 63 0137c
Unclassified report

Descriptors: (*Beryllium, Wire), (*Wire, Drawing (Machine processing)), Mechanical properties, Cladding, Steel.

The results of six months work directed toward development of a process for the production of ultrafine beryllium wire by warm drawing techniques are described. Clad drawing was found to be unacceptable. Using conventional drawing techniques, long lengths, 200 feet and over of 0.0018-in. diameter, shorter lengths, 50 to 25 feet of 0.0015-in. diameter, and very short length, under 2 feet of 0.00115-in. diameter beryllium wire were produced. The mechanical properties of drawn beryllium wire between the sizes of 0.010 and 0.001497-inch diameter are described. (Author)

AD-419 009 Div. 17
OTS price $1.00

Metcut Research Associates, Cincinnati, Ohio.
MACHINABILITY OF NICKEL-TITANIUM ALLOYS,
by John V. Gould. 24 June 63, 32p. Rept. no. 573 4062 1
Contract N60921 6814
Unclassified report

Descriptors: (*Nickel alloys, Machining), (*Machining, Nickel alloys), Titanium alloys, Cutting tools, Test methods, Grinding wheels, Abrasives, Tables, Cutting fluids, Data, Intermetallic compounds.

The purpose of this project was to determine the machining characteristics of the ductile intermetallic compound NiTi alloys. This was accomplished by conducting tool life tests in turning, face milling, drilling and tapping these alloys. In addition, grinding tests were also made. The results of these tests were then used in establishing the recommended cutting speeds, feeds, tool geometries, cutting fluids and grinding conditions for machining the alloys. While the scope of this investigation was somewhat limited by the availability of each of the alloys, the tests were designed to extract as much machining data as possible from the shapes and quantities supplied. (Author)

AD-419 028 Div. 17, 25
OTS price $7.60

Institute of Engineering Research, U. of Calif., Berkeley.
THERMAL RADIATION PROPERTIES OF MATERIALS, PART III.
Final rept.,
by R. A. Seban. Aug 63, 68p.
Contract AF33 657 7793, Proj. 7360, Task 736001
WADD TR60 370, pt. 2 Unclassified report

Descriptors: (*Metals, Thermal radiation), (*Alloys, Thermal radiation), (*Thermal radiation, Metals), Materials, Emissivity, Platinum, Nickel, Molybdenum, Copper, Nickel alloys, Chromium alloys, Stainless steel, Titanium compounds, Dioxides, Oxidation, Coatings, Metal coatings, Absorption spectrum.

The effect of temperature on the normal spectral emittance in the range from 1 to 15 microns is demonstrated for certain polished metals and some oxidized and coated metals by a comparison of absorptances measured at room temperature and emittances measured at temperatures of the order of 2000 to 2500 R. The emittances were obtained in a system designed and constructed in the previous phase of this research and these results are affected by the less than optimum operation of this system, by which contamination of the sample occurred, irregularly but consistently. The results for Pt, Ni, and Fe reveal at high temperature the correspondence with the Hagen-Rubens law which is implied by available results on the total normal emittance, though the correspondence in this spectral range must be attributed to anomalous effects. With oxides and with coated materials the effect of temperature on the spectral values appears to be small and localized, though with some materials these are indications of permanent changes in the emittance as the period of exposure to high temperature is increased. (Author)

AD-419 031 Div. 17, 26, 1
OTS price $4.60

Lodge and Shipley Co., Cincinnati, Ohio.
FABRICATION OF AN HK31A MAGNESIUM ALLOY AIRFRAME SKIN,
by J. A. Warnken and W. H. Busch. June 63, 1v.
Contract DA33 008ORD2084, Proj 512 15 023
Unclassified report

Descriptors: (*Magnesium alloys, Metal spinning), (*Airframes, Magnesium alloys), Shear stresses, Sheets, Metal plates, Manufacturing methods, Material forming, Mechanical working, Experimental data, Rolling (Metallurgy), Thickness, Thorium alloys, Zinc alloys.

The forming of Ogival Contoured Airframe Skins of HK31A Magnesium Alloy by a combination of shear forming and template-controlled power spinning starting with a flat blank of sheet or plate stock is entirely feasible, provided that the workpiece and tooling are maintained at a suitable temperature. (Author)

AD-419 177 Div. 17
OTS Price $2.60

Lessells and Associate, Inc., Waltham, Mass.
ACOUSTIC EMISSION UNDER APPLIED STRESS,
Rept. for 15 Apr 62-15 Mar 63,
by B. H. Schofield. Apr 63, 17p.
Contract AF33 657 8562, Proj. 7360, Task 736002
ASD TDR63 509 P.1 Unclassified report

Descriptors: (*Metals, Deformation), (*Metallic crystals, Acoustic properties), (*Single crystals, Aluminum), Acoustics, Strain (Mechanics), Stresses, Surface properties, Oxides.

This report concerns specific investigation undertaken to assess the role of the surface oxide layer in the generation of acoustic pulses in metals, i.e., acoustic emission. Experiments were conducted on single crystals of aluminum of different crystallographic orientation. The specimens were pulled in tension both in atmosphere and exposed to etchant solutions. Results demonstrated the oxide layer is not itself an emission source and that the emission characteristics are significantly modified as a result of the influence of the oxide on the deformation behavior of the specimens. Specific observations suggest the operative mechanism of emission generation and the importance of the role played by the surface condition in the deformation of metals. (Author)

AD-419 214 Div. 17, 25, 30
OTS price $5.60

General Mills, Inc., Minneapolis, Minn.
INVESTIGATION OF SURFACE ENERGY STATES OF SINGLE CRYSTAL METALS.
Interim technical rept. 15 Jan 62-15 Jan 63,
by R. C. Menard and A. A. Anderson. Aug 63, 51p.
Contract AF33 657 8038, Proj. 7022, Task 7022 01
ARL 63 139 Unclassified report

Descriptors: (*Metals, Surface properties), Cleaning, Ion beams, Ion bombardment, Single crystals, Design, Copper, Titanium, Friction, Electric potential, Vacuum apparatus.

A unique ion beam sputter cleaning apparatus has been developed to operate in a high vacuum system. This apparatus, known as a unoplasmatron, creates positive ions from various gases and focuses them into a beam of controlled density and energy. Bombarding ion currents of 80 microamps have been attained. Experiments have shown that this current is sufficient to produce large, smooth, brightly-etched surfaces on copper specimens in less than 1 hour. A contact potential device has also been developed to study the surface energy of single-crystal metals in a vacuum. This device utilizes the vibrating condenser technique. Contact potential measurements of polycrystalline copper in this laboratory compare favorably with measurements reported in the literature. The changing contact potential of a clean titanium surface exposed to air has been measured. The contact potential varied from about 230 to 330 mv. The accuracy of these measurements is believed to be about ±5 mv. (Author)

AD-419 216 Div. 17, 25
OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
MAGNETIC PROPERTIES OF A SERIES OF NICKEL-COPPER-IRON ALLOYS,
by George L. Rosenhauer. Aug 63, 74p.
GAE/PHYS/63-1
Unclassified report

Masters thesis.

Descriptors: (*Nickel alloys, Magnetic properties), (*Copper alloys, Magnetic properties), (*Iron alloys, Magnetic properties), Melting, Permeability (Magnetic), Measurement, Atomic energy levels, Theory, Ferromagnetism, Hysteresis, Temperature, Temperature sensitive elements.

Investigation of the magnetic properties of a series of Ni-Cu-Fe alloys was motivated by the need for telemetry of human body temperature. Ni-Cu-Fe alloys were prepared by levitation melting of compressed chips of the pure metals. Over one hundred alloys were prepared in this manner and measurement of the individual Curie temperatures provided additional information for the Ni-Cu-Fe ternary. The area of the Ni-Cu-Fe ternary investigated was within the limits, 47-53% Copper, 40-48% Nickel, and 4-8% Iron. (Author)

AD-419 243 Div. 17, 8
OTS price $1.10

RCA Labs., Div., Radio Corp. of America, Princeton, N. J.
THERMOELECTRIC MATERIALS FOR POWER CONVERSION.
Quarterly progress rept. nos. 1 and 2,
1 Feb-31 July 63.
31 July 63, 5p.
Contract NObs88595, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: (*Thermoelectricity, Materials), Silicon alloys, Germanium alloys, Solid solutions, Specific heat, Temperature, Thermal conductivity, Photons.

A series of extremely homogeneous Si-Ge solid solution alloys were prepared by the horizontal zone-melting technique. The materials of various compositions were used to make accurate determinations of density, lattice parameter, phase equilibria, and band gap as functions of composition. The densities of about 100 samples were determined to an accuracy of ±0.1% by the method of Archimedes. The solidus temperatures were determined at intervals of 5-10%Si by the DTA method, and the results confirm the original (1939) phase diagram of Stohr and Klemm. (Author)

AD-419 277 Div. 17, 12
OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
MOLYBDENUM STRUCTURAL COMPONENT PROGRAM.
Interim progress rept., 1 May-1 Aug 63,
by R. H. Hepper. 30 July 63, 5p.
Contract NOw61 0653 t
Unclassified report

Descriptors: (*Molybdenum, Structural properties), Electron beams, Welding, Panels (Structural), Leading edge flaps, Guided missile components, Structural parts.

AD-419 280 Div. 17
OTS price $5.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
EXPERIMENTAL STUDY OF FACTORS CONTROLLING THE EFFECTIVENESS OF HIGH-TEMPERATURE PROTECTIVE COATINGS FOR TUNGSTEN.
Quarterly progress rept. no. 3, 15 Nov 62-15 Feb 63,
by C. D. Dickinson and L. L. Seigle.
15 Mar 63, 1v. Rept. no. TR63 461 10
Contract AF33 657 8787
Unclassified report

Descriptors: (*Refractory metals and alloys, Oxidation), (*Oxidation, Refractory metals and alloys), Tungsten alloys, High temperature research, Diffusion, Evaporation, Films, Oxides, Nitrogen, Oxygen, Thorium alloys, Zirconium alloys, Oxidation, Nitrides, Hafnium alloys, Aluminum alloys, Vacuum, Sintering, Electric arcs, Melting, Rhenium alloys, Coatings, Tungsten, X-ray diffraction analysis, Solid solutions, Surfaces, Tin alloys, Chromium alloys.

Two processes governing the efficacy of high-temperature protective coatings for tungsten, interdiffusion in ternary oxygen-metal-metal systems and breakaway during oxide film growth, are being investigated experimentally to determine the oxidation behavior of binary alloys and the influence of substrate mechanical properties on the growth characteristics of the oxide films. Experiments on oxidation kinetics and the microstructural and quantitative identification of the layers formed have been conducted on seven systems. Experiments on the effect of nitrogen on the diffusion processes that govern the growth of oxides in the Zr-Th-O system are described. The results obtained in the W-Hf-O, W-Hf-Re-O, Zr-N-O and ZrN-ThN-O systems and the Sn-Al-Cr and Sn-Al-La systems are given. Preliminary experiments on the Zr-Y-O and Hf-Y-O systems are described. (Author)

AD-419 295 Div. 17
OTS price $3.60

Lockheed Aircraft Corp., Burbank, Calif.
FATIGUE BEHAVIOR OF MATERIALS FOR THE SUPERSONIC TRANSPORT.
Rept. for 1 May-31 July 63,
by A. J. McCulloch. 31 July 63, 34p. LR17129
Contract AF33 657 11460
Unclassified report

Descriptors: (*Fatigue (Mechanics), Alloys), Titanium alloys, Stainless steel, Nickel alloys, Sheets, Tensile properties, Loading (Mechanics), Stresses, Temperature, Thermal stresses, Time, Test methods, Data, Tables, Design, Supersonic planes, Airframes.

The fatigue behavior of candidate sheet materials subjected to supersonic transport load-temperature environments is being evaluated. Three specimen geometries in each of three materials will be used. Constant load amplitude tests will be carried out on specimens without prior exposure and on specimens exposed to load at temperatures of 400 and 650 F for periods to 100, 1,000, and 5,000 hours. The effects of contaminants will be similarly evaluated using exposure at 650 F for 1,000 hours. In addition, realistic wing root loading spectra will be applied on a flight-by-flight basis. In one set of these tests the time at temperature and the sequence of thermal stress cycles will be representative of actual service. In a second set of tests the time at elevated temperature during each ''flight'' will be minimized. Finally, tests will be carried out to evaluate the effect of the cycle of pressurization and thermal loading which occurs in fuselage skins once every flight. (Author)

AD-419 315 Div. 17, 30
OTS price $3.60

Minnesota U., Minneapolis.
MATERIAL DAMPING UNDER BIAXIAL STATE OF STRESS GENERATED BY COMBINED AXIAL AND INTERNAL PRESSURE LOADINGS.
Final rept., Feb-Sep 62,
by T. J. Mentel and S. H. Chi. July 63, 30p.
Contract AF33 657 7453, Proj. 7351, Task 735106
ASD TDR63 647 Unclassified report

Descriptors: (*Test equipment, Damping), (*Manganese alloys, Damping), (*Damping, Manganese alloys), Cylindrical bodies, Loading (Mechanics), Stresses, Strain (Mechanics), Experimental data, Calibration, Theory, Copper alloys, Pressure, Metals, Mechanics.

A test machine was constructed which measures material damping in thin-walled, cylindrical specimens subject of combined internal pressure and axial cyclic loading. The purpose of this machine is to allow the complete range of biaxial stress states to be developed, so that the individual damping effects of distortional and dilatational straining action might be clearly discerned. Experimental results on a series of manganese alloy specimens are found to display significant damping effect associated with dilatational straining. (Author)

AD-419 339 Div. 17
OTS price $4.60

Alloyd Corp., Cambridge, Mass.
AN INVESTIGATION OF METALLIC THIN FILM COMPOSITE MATERIALS,
by R. A. Covert and R. Rabinowicz. June 62, 41p.
Contracts AF33 616 6479 and AF33 616 7091,
Proj. 7353, Task 735302
ASD TDR62 617 Unclassified report

Descriptors: (*Composite materials, Metal films), (*Metal films, Composite materials), Vacuum, Evaporation, Electrodeposition, Vacuum apparatus, Rolling (Metallurgy), Test equipment, Test methods, Mechanical properties, Hardness, Fracture (Mechanics), Tensile properties, Theory, Single crystals, Silver, Magnesium, Copper, Chromium, Iron, Lead, Zinc, Tables, Tin, Cadmium, Crystal lattice defects.

This report covers a study of metallic, multiple layer composite materials. Samples of Ag-Cr, Ag-Fe, Ag-Cu, Ag-Mg, Pb-Zn, Cd-Sn and Pb-Sn have been considered. Three fabrication techniques were considered--alternate evaporation in vacua, alternate electroplating and cold rolling of alternate layer stacks. Significant strength increases over pure and alloy materials have been observed for Ag-Cu and Pb-Zn composites. These strengths do not approach the theoretically predicted levels, but the authors feel that they do warrant further study. (Author)

AD-419 383 Div. 17, 14
OTS price $1.00

Defense Metals Information Center, Columbus, Ohio.
STRUCTURAL CONSIDERATIONS IN DEVELOPING REFRACTORY METAL ALLOYS,
by R. I. Jaffee and G. T. Hahn. 31 Jan 63, 30p.
Rept. no. 182
Contract AF33 616 7747, Proj. 28 8975
Unclassified report

Descriptors: (*Refractory metals & alloys, Microstructure), (*Heat-resistant metals & alloys, Grain structures (Metallurgy)), (*Group VI elements, Metals), Mechanical properties, Crystal lattices, Phase studies, Chemical bonds, Electrons, Impurities, Shear stresses, Tensile properties, Tungsten, Molybdenum, Chro-

mium, Brittleness, Carbides, Stability, Molybdenum alloys, Tungsten alloys, Chromium alloys, Electron microscopy, Metallurgy, Fracture (Mechanics), Rhenium.

Progress made in applying advanced techniques and structural concepts to the problem of strengthening the Group VI-A metals, Cr, Mo, and W, is examined. At low temperatures, T/T sub m <0.2, dislocations and grain boundaries play an important role. High strength values and the marked temperature and strain-rate dependence of the yield stress exhibited by the Group VI-A metals in this range are consistent with the idea that dislocation movement is rate controlling and thermally activated. Dislocation-mobility considerations also point to the existence of high stresses in advance of a moving crack, and consequently, a low level of crack-propagation resistance. A second factor contributing to the brittleness of the Group VI-A metals is grain-boundary weakness caused by interstitial-atom impurities. Studies of rhenium additions to the Group VI-A metals suggest that the brittleness tendency can be inhibited by alloying. The origin of this effect has not been decided. (Author)

AD-419 514 Div. 17, 25
OTS price $9.10

Du Pont De Nemours, E. I., and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Final rept., 13 June 62-13 June 63,
by W. T. Hicks and H. Valdsaar. 1 Aug 63, 1v.
Contract NObs84824, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: (*Selenides, Thermoelectricity), (*Tellurides, Thermoelectricity), (*Thermoelectricity, Materials), Selenium alloys, Tellurium alloys, Solid solutions, Group V elements, Group VI elements, Bonding, Stability, Tungsten alloy, Processing, Tantalum, Lead alloys, Encapsulation, Electric power production, Molybdenum, Vapor pressure, Electrical conductance, Hall effect, Copper, Chemical properties, Physical properties, Stainless steel, Coatings, Nickel, Flame spraying, Zirconium compounds, Oxides, Thermal conductivity, Electrical properties.

Tantalum substitutions at concentrations up to 5 at.% have been made in WSe2, MoSe2 and MoTe2. Of these, p-type WSe2 doped with Ta had the best thermoelectric properties. Substitution of a number of other elements was attempted in WSe2 and MoSe2, but only Group VB metals were sufficiently soluble to give materials with electrical conductivities at useful levels. (Author)

AD-419 549 Div. 17
OTS price $1.60

Metals and Controls, Inc., Attleboro, Mass.
STUDY OF DUCTILE COATINGS FOR THE OXIDATION PROTECTION OF COLUMBIUM AND MOLYBDENUM ALLOYS.
Bimonthly progress rept. no. 1, 1 July-31 Aug 63,
by B. J. Bliss and J. J. Buchinski. 30 Sep 63, 14p.
Contract NOw63 0706C
Unclassified report

Descriptors: (*Niobium alloys, Metal coatings), (*Molybdenum alloys, Metal coatings), (*Metal coatings, Refractory metals and alloys), (*Refractory metals and alloys, Metal coatings), High temperature research, Platinum, Oxidation, Rhodium, Platinum alloys, Rhodium alloys, Diffusion, Ductility, Tables, Iridium, Iridium alloys, Air, Molybdenum, Osmium, Ruthenium.

Present day oxidation resistant coatings for columbium and molybdenum base alloys are deficient in ductility. Feasibility of developing ductile coatings for service to 3000 F is being explored, initially based on the use of platinum metals. Development of suitable diffusion barriers is required if platinum metals are to be successful. Literature review of the performance of present day coatings and platinum metals has been conducted. Review of diffusion barrier literature has begun. Equipment for screening oxidation tests has been set up and calibrated. Weight loss tests for platinum metals are under way. Columbium FS85 alloy and molybdenum TZM base metals have been ordered along with platinum coating metals. A testing and evaluation program to produce and screen potentially useful composites is presented. (Author)

AD-419 555 Div. 17, 4
OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REACTIVITY OF TITANIUM WITH GASEOUS N2O4 UNDER CONDITIONS OF TENSILE RUPTURE,
by J. D. Jackson, P. D. Miller, and W. K. Boyd.
1 Aug 63, 7p. DMIC memo. 173
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Titanium, Chemical reactions), (*Nitrogen compounds, Tetroxides), (*Titanium alloys, Chemical reactions), Gases, Surface area, Aluminum alloys, Vanadium alloys, Impact shock, Sensitivity, Tensile properties, Rupture, Liquefied gases, Compatibility.

Titanium is known to be impact sensitive in liquid N2O4, although it is much less sensitive to impact in this medium than in liquid oxygen. A limited study was made to determine whether reactions can occur between a freshly ruptured titanium surface and gaseous N2O4 similar to reactions between titanium and gaseous oxygen. Experimental conditions were chosen which were more severe than those existing in actual service. No reactions were observed when commercially pure titanium or Ti-6Al-4V were ruptured in gaseous N2O4 at pressures as high as 535 psi and at a temperature of about 260 F. (Author)

AD-419 617 Div. 17, 31
OTS price $1.00

Illinois U., Urbana.
A STUDY OF BRITTLE FRACTURE INITIATION IN MILD STEEL.
Technical rept.,
by F. W. Barton and W. J. Hall. 15 July 63, 30p.
Contract NObs65790, Proj. SR155
SSC 147 Unclassified report

In cooperation with Committee on Ship Structure, National Research Council, Washington, D. C.,
Contract NObs84321.

Descriptors: (*Steel, Fracture (Mechanics)), Ship structural components, Stresses, Elasticity, Mathematical analysis, Strain (Mechanics), Surfaces, Thickness, Loading (Mechanics), Tensile properties, Low-temperature research, Distribution, Deformation.

The purpose of this investigation was to study the conditions of brittle-fracture initiation in low-carbon steel. An elastic-plastic stress analysis was developed from which the state of stress along the minimum section of a notched specimen could be determined as a function of the average applied stress and the yield stress. A series of tests on plate-type specimens, with the same notch configuration as that used in the stress analysis, provided experimental values of average fracture stress under various test conditions. Application of the elastic-plastic stress analysis to the experimental results provided a theoretical prediction of the state of stress at the instant and location of fracture initation and also an indication of the position of the elastic-plastic boundary at fracture. It was found that the stress condition necessary for brittle fracture initiation, in the mild-steel specimens studied, was achieved when the maximum tensile stress reached a critical value of approximately 246.000 psi. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-419 000 Div. 18, 26
OTS Price $8.60

Air Force Systems Command, Washington, D. C.
A SUMMARY OF LESSONS LEARNED FROM AIR FORCE MANAGEMENT SURVEYS.
1 June 63, 90p.

AFSCP 375 2 Unclassified report

Descriptors: (*Management Engineering, Air Force research), Air Force, Economics, Industrial relations, Effectiveness, Job analysis, Budgets, Production, Quality control, Procurement.

AD-419 391 Div. 18
OTS price $2.60

RAND Corp., Santa Monica, Calif.
INITIAL SUPPORT PLANNING: PROBLEMS AND METHODS,
by H. S. Campbell. Sep 63, 23p. Memo. RM3845PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Weapon systems, Ground support equipment), (*Ground support equipment, Logistics), Management engineering, Maintenance personnel, Aircraft, Air force equipment, Costs, Analysis.

The general hypothesis of this Memorandum is that a significant portion of the initial support planning problem concerns deciding on the proper location of major logistics activities such as the repair of engines, the repair of aircraft components, the performance of scheduled maintenance, and the correction of malfunctions that can safely be deferred or that are relatively rare. The study examines data describing the logistics inputs required by a currently operational airplane, and discusses the task of acquiring planning input information at the time of initial provisioning. A method is discussed for analyzing the parts-repair function, considering support costs for base-level repair (ground equipment, personnel, supply of bits and pieces, and demands for depot supply and transportation), and using shelf fill rate as a proxy for military effectiveness. The investigation shows the possibility of cost reductions from a mixed or selective policy with regard to base repair. (Author)

AD-419 663 Div. 18, 30
OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 447 EQUIPMENT COVERED BY THE FOLLOWING MODEL SPECS: STL DOC. 6120-X130-DC002 DATED 28 MARCH 1963, AND CCN 893, DTD. 6 JUNE 1963,
by Carl J. Lish. 17 Sep 63, 16p. D2 10889 2, Vol. 59
Contract AF04 647 289
Unclassified report

Descriptors: (*Documentation, Air force research), (*Research program administration, Records), Military requirements.

19. NAVIGATION

AD-419 476 Div. 19
OTS price $10.10

Aeronutronic, Newport Beach, Calif.
RESEARCH IN GEODESY AND GRAVITY. COMPUTER PROGRAMS FOR ORBIT CORRECTION AND STATION LOCATION. Final rept.,
by C. G. Hilton, J. E. Evans and L. Nicola.
Aug 62, 121p. Publication no. U1490
Contract AF19 604 7253
AFCRL 62 892 Unclassified report

Descriptors: (*Orbital trajectories, Corrections), Errors, Mathematical analysis, Programming (Computers).

Two computer programs are described. The first corrects the orbital elements of a geodetic satellite. The second uses residuals generated by the first program to correct the geocentric coordinates of the observing sensors and of the origin of the datum by which a set of such sensors are connected. (Author)

AD-419 538 Div. 19, 12
OTS price $5.60

Vitro Corp. of America, New York.
A HISTORY OF INERTIAL GUIDANCE,
by F. K. Mueller. 1963, 45p.
Contract DA30 069ORD2331
Unclassified report

Descriptors: (*Inertial guidance, Reviews), (*Guided missiles (Surface-to-surface), Inertial guidance), Design, Flight control systems, Effectiveness, Construction, Gyroscopes, Accelerometers.

This report deals with the development of inertial guidance systems for ballistic missiles. It covers the evolution of guidance devices from the early days of experimentation during the 1930's, through the operational use of the workhorse LEV-3 system on the German V-2 rockets, to the reliable and accurate guidance mechanisms of today. Personnel of the ABMA Laboratories, with experience dating as far back as pre-World War II days, made great contributions to the advancement of the art, science and engineering of inertial guidance systems. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-419 006 Div. 20, 18
OTS price $10.10

Edgerton, Germeshausen, and Grier, Inc., Santa Barbara, Calif.
RADIOLOGICAL MONITORING FOR CIVIL DEFENSE.

13 Aug 63, 123p. S 235 R
Contract OCD05 62 172
Unclassified report

Descriptors: (*Civil defense systems, Radiation measurement systems), (*Radiation monitors, Radioactive fallout), Instrumentation, Radiation hazards, Aerial reconnaissance, Automation, Communication systems, Data transmission systems, Mobilization.

Radiological monitoring and fallout prediction concepts of the present civil defense program are presented and recommendations made for improving the program. The conclusions and recommendations result from a detailed study of the radiological information needs and various radiological monitoring methods. This study included instrumentation and equipment, small scale perturbations of the radiation field by various factors, and fallout prediction methods. The recommendations made include using aerial monitoring techniques as the primary radiological monitoring method and considering the use of a fixed automatic system at the national level only. Other specific recommendations involve instrumentation, training, and organization. (Author)

AD-419 111 Div. 20
OTS Price $5.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
PHOTOGRAPHIC MEASUREMENTS ON BANSHEE SUPPLEMENT NO. 1-1962 EVENTS,
by James C. McCue and Donald F. Hansen. 13 Sep 63, 50p. Rept. no. B2602
Contract DA49 146XZ092,
DASA Rept no. 1393 1 Unclassified report

Descriptors: (*Photography, Measurements), (*Nuclear explosions, Photography), Balloons, Instrumentation, Data, Analysis, Time, Cameras, Telescopes, Firing circuits, Pressure, Hydrodynamics, Photographic analysis.

During the summer of 1962 several Phase I and Phase II BANSHEE events were scheduled at White Sands Missile Range in an attempt to conclude these phases of the operation. Unavoidable weather conditions prevented any Phase II events (missile-borne charge, instrumented balloon) from being completed, but five Phase I events (charge and instrumentation canisters on balloon dragline) were accomplished. Of these, three were successfully covered by fireball photography. The altitudes of these three events were 103,726 feet (B-20), 103,370 feet (B-20A), and 81,258 feet (B-24A). Data reduction and analysis were performed along the lines established in the earlier report. Radius versus time plots of the 1962 data indicate, as would be expected, a more rapid expansion rate of the fireball at early-times. Reduced radius versus reduced time plots are found to be in fair agreement with the scaled data from earlier events for time values. Beyond this time value, the higher altitude data produce larger radius values, and do not exhibit the gradual tapering-off observed for the earlier events.(Author)

AD-419 181 Div. 20
OTS price $3.60

United Nuclear Corp., White Plains, N. Y.
NEUTRON CROSS SECTIONS OF NATURAL CHLORINE,
by M. H. Kalos and J. H. Ray. 30 Sep 63, 27p.
Rept no. UNC5067
Contract DA18 108CML7156, Proj. 2185
Unclassified report

Descriptors: (*Neutron cross sections, Chlorine), (*Chlorine, Neutron cross sections), Neutron scattering, Isotopes, Inelastic scattering, Neutron capture, Neutrons, Gamma rays, Elastic scattering, Energy, Resonance, Tables, Special functions.

Complete sets of cross sections for natural chlorine are presented for the range of incident neutron energies from 0.02 ev to 18 Mev. (Author)

AD-419 293 Div. 20
OTS price $14.00

Radio Corp. of America, Bethesda, Md.
DETERMINATION OF PARAMETERS FOR RADIOLOGICAL PREDICTION AND MONITORING SYSTEMS,
by P. Reimers, C. Diehm, B. Holz, H. Kurkjian and D. Hatheway. June 63, 1v.
Contract OCD OS62 140
Unclassified report

Descriptors: (*Radiological dosage, Monitors) (*Monitors, Radiological dosage), Gamma rays, Radioactive fallout.

AD-419 308 Div. 20, 25
OTS price $3.60

Space Technology Labs., Inc., Redondo Beach, Calif.
A DYNAMICAL THEORY OF BARYONS,
by H. C. Corben. Dec 63, 31p. Rept. no. 8665 6002RU000
Contract Nonr3769 00, Proj. NR013 110
Unclassified report

Descriptors: (*Baryons, Theory), (*Quantum statistics, Relativity theory), (*Nuclear spins, Elementary particles), Quantum mechanics, Field theory, Motion, Equations, Operators (Mathematics), Neutrons, Protons.

The simplest relativistic wave equations for a particle which in the classical limit possesses moments of inertia about more than one axis are Dirac and Kemmer-Duffin equations containing extra terms which cause these equations to describe a variety of spin states. The classical field theory of such wave equations is developed and the generalized Dirac equation for particles of spin 1/2 and 3/2 is examined in detail. It is found that with the choice of only one parameter, which merely determines the scale, this equation not only correctly describes the spin and charge states of the particles and resonances, it also yields their masses correct to better than 2%. In addition, with the same choice of this parameter, the theory has so far yielded the correct masses, to the same accuracy, for the resonances, giving their spins as 5/2, 5/2, 7/2 and 9/2 respectively. The differences have the correct sign but are several times their observed values. (Author)

AD-419 313 Div. 20, 21, 25, 30
OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A HEAT TRANSFER STUDY OF A NUCLEAR ROCKET REACTOR,
by Charles Frederick DeMos. Aug 63, 62p. Rept. no. GA Phys 63 2
Unclassified report

Master's thesis.

Descriptors: (*Nuclear reactors, Rockets), (*Heat transfer, Nuclear reactors), (*Programming languages, Digital computers), Coolants, Power, Hydrogen, Reactor fuels, Transport properties, Thermal conductivity, Nuclear propulsion, Thrust, Gaseous rocket propellants, Rocket motor nozzles, Control, Convection, Viscosity, Temperature, Pressure, Surface temperature, Gas flow, Punched cards, Control sequences, Equations.

A digital computer program was developed to investigate the coolant temperature and pressure and the material temperatures in a nuclear rocket reactor. The reactor uses hydrogen gas as the coolant and is operating under steady-state conditions. The program is written in FORTRAN for execution on an IBM 7090 digital computer. Reactor geometry, input conditions of the coolant, power, power distribution, and reactor fuel thermal conductivity are variable input qualities. The hydrogen is treated as a perfect gas and the reactor is assumed to be perfectly insulated. The coolant and material temperatures are determined by an iterative technique. The transport properties of hydrogen are computed by empirical formulas which include the effect of both temperature and pressure. The FORTRAN source program, operating instructions, a sample problem and sample output data are included as appendices. (Author)

AD-419 334 Div. 20, 18, 14
OTS price $11.50

Naval Radiological Defense Lab., San Francisco, Calif.
RECOVERY OF PETROLEUM REFINERIES CONTAMINATED BY FALLOUT,
by L. Minvielle and W. Van Horn. 24 June 63, 141p.
NRDL TR656 Unclassified report

Descriptors: (*Radioactive fallout, Petroleum industry), (*Petroleum industry, Radiological contamination), Nuclear explosions, Personnel, Refineries, Petroleum, Measurement, Decontamination.

The present study deals with the petroleum refinery industry. The case studied is that in which a given refinery is contaminated by radioactive fallout from one or more nuclear detonations occurring essentially simultaneously at some distance so that the refinery is not damaged by blast or fire. Recommendations are made that would reduce the effects of such attacks on oil refineries and expedite their recovery. (Author)

AD-419 347 Div. 20, 22
OTS price $1.50

Boeing Co., Seattle, Wash.
EJECTA STUDIES.
Preliminary rept.,
by W. A. Roberts and R. H. Carlson. 25 Apr 63, 62p.
AEC Rept. no. PNE217P Unclassified report

Report on Plowshare Program--Project Sedan.

Descriptors: (*Nuclear explosions, Surface burst), (*Ejection, Nuclear explosions), Underground explosions, Density, Sampling, Measurement, Cratering, Impact shock, Concrete, Structures, Experimental data, Nuclear explosion damage.

This project included 146 ejecta measurement stations encircling ground zero at eight radial distances ranging from 373 to 1,707 meters. The twenty-four sampling lines were spaced at fifteen-degree intervals. Data presented were recovered from stations located at radial distances of 640, 853, 1,067, 1,280, and 1,707 meters. An attempt will be made to recover data at stations located closer to ground zero at a later time. Preliminary analysis of ejecta data indicates that a real density varies inversely as distance raised to the 3.64 power. Circumferential variation of areal density is about a factor of 30 at the 1,707 meter radial distance, a factor of 10 at the 1,280 meter radial distance, and a factor of 7 at the 853 meter radial distance. (Author)

AD-419 431 Div. 20
OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
TRANSMISSION BY THE EARTH'S ATMOSPHERE OF THERMAL ENERGY FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE,
by Thomas O. Passell. 30 Apr 63, 56p.
Contract OCD OS62 135, SRI Proj. IMU4021 302
Unclassified report

Descriptors: (*Nuclear explosions, Upper atmosphere), (*Thermal radiation, Atmosphere), Nuclear reactions, Detonations, High altitude, Attenuation, Heat transfer, Meteorological phenomena, Meteorological parameters, Cloud cover, Photons, Frequency, Ranges (Distance), Sky brightness, Solar radiation, Bibliographies.

The extensive literature on transmission of solar energy by the earth's atmosphere supports transmission estimates for the average clear day at sea level ranging from around 80% for vertical rays to around 15% for rays 5 degrees above horizontal. Cloud transmission (on the basis of 100% for a clear day) varies from around 30% for light cloud to around 3% for a dense cloud. Transmission factors can be computed when the more important atmospheric parameters are known, namely, (1) thickness, liquid content, and droplet size of clouds; (2) size and volume concentration of solid haze particles; (3) reflectivity of the earth's surface. Theoretically estimated upper limits to the unattenuated energy flux from a 1000-mt detonation combined with the above estimates of atmospheric transmission give ignition radii ranging from 250 km to 50-km burst height to 0 km at 240-km burst height. A conscious attempt has been made in this study to give upper limits to both transmission factors and energy fluxes. Thus, in real world situations, the ground effects are expected to be substantially less extensive and less intensive than these estimates would indicate. (Author)

AD-419 433 Div. 20
OTS price $1.10

California Inst. of Tech., Pasadena.
RELATIVE SIGNS OF THE 31P-1H AND 31P-C-1H N.M.R. COUPLING CONSTANTS,
by George M. Whitesides, Jesse L. Beauchamp and John D. Roberts. Apr 63, 6p. Technical rept. no. 23
Contract Nonr22026, Proj. NR055 388
Unclassified report

Descriptors: (*Nuclear spins, Organic compounds), (*Atomic spectroscopy, Analysis), Atomic properties, Nuclear magnetic resonance, Atomic orbitals, Chemical bonds, Anisotropy, Phosphorus, Transition elements, Polarization, Line spectrum.

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-419 453 Div. 20, 4
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIONUCLIDE RELEASE FROM AERO-SPACE NUCLEAR REACTOR FUELS. I. SAFETY ANALYSIS OF PULSED NEUTRON IRRADIATION OF DRY FUEL,
by J. L. Mackin and P. E. Zigman. 8 Aug 63, 24p.
NRDL TR669 Unclassified report

Descriptors: (*Reactor fuels, Fission products), (*Reactor accidents, Simulation), Reactor hazards, Nuclear reactors, Temperature, Pressure, Nuclear power plants, Nuclear propulsion, Aerospace craft, Water, Sea water.

The safety of in-core exposures of ROVER/NERVA fuel to pulsed neutron irradiation has been analyzed. Exposure in a dry environment of fuel specimens containing one gram of U-235 to a TRIGA Mark F power transient (following a three dollar step increase in reactivity) was examined. These examinations indicate that expected temperatures, pressures and radiation levels are well within required safety limits. (Author)

AD-419 497 Div. 20, 14, 17, 4, 10, 8, 7
OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 25.
15 July 59, 22p. Accession list 25
Contract AF33 616 6564, Proj. 2133, Task 60001
Unclassified report

Descriptors: (*Bibliographies, Radiation damage), (*Indexes, Radiation damage), (*Abstracts, Radiation damage), (*Radiation damage, Materials), Propellants, Electrical equipment, Electronic equipment, Polymers, Fuels, Lubricants, Hydraulic fluids, Ceramic materials, Metals, Alloys, Organic compounds, Inorganic compounds, Dosimeters.

Contents:
Electrical and Electronic Systems
Polymeric Materials
Ceramic Materials
Metals and Alloys
Organic Chemicals
Inorganic Chemicals
Facilities
Dosimetry
Space Radiation

AD-419 498 Div. 20, 14, 17, 4, 10, 8, 7
OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 26.
15 Aug 59, 25p. Accession list 26
Contract AF33 616 6564, Proj. 2133, Task 60001
Unclassified report

Descriptors: (*Bibliographies, Radiation damage), (*Indexes, Radiation damage), (*Abstracts, Radiation damage), (*Radiation damage, Materials), Propellants, Electrical equipment, Electronic equipment, Polymers, Fuels, Lubricants, Hydraulic fluids, Ceramic materials, Metals, Alloys, Organic compounds, Dosimeters.

Contents: Electrical and electronic systems; Polymeric materials; Fuels, lubricants, and hydraulic fluids; Ceramic materials; Metals and alloys; Organic chemicals; Inorganic chemicals and propellants; Facilities; Dosimetry; Space radiation

AD-419 629 Div. 20
OTS price $1.25

Massachusetts Inst. of Tech., Cambridge.
THE EFFECTS OF CHANGING ECONOMIC CONDITIONS ON FUEL CYCLE COSTS IN PRESSURIZED WATER REACTORS,
by Manson Benedict, Henri Fenech and Max C. Richardson. 1 Feb 63, 47p. Rept. no. MITNE28
Unclassified report

Descriptors: (*Pressurized water reactors, Economics), (*Reactor fuels, Costs), Nuclear power plants, Fuel burn up, Uranium, Plutonium, Reactor operation, Reactor fuel processing, Reactor fuel cladding.

A study made by MIT for ECNG of the effect of changing economic conditions on fuel cycle costs in nuclear power systems is described. Fuel cycle costs are computed for eight different cost bases, which may be used to represent the effect of most of the combinations of economic conditions likely to occur during the life of the reactor selected for study. This is an advanced pressurized-water reactor with free-standing stainless steel of Zircaloy fuel cladding, designed for a net electric output of 461 Mw. (Author)

AD-419 635 Div. 20
OTS price $7.60

California U., Berkeley.
NUCLEAR MAGNETIC RESONANCE IN THE DEMAGNETIZED STATE. I,
by A. G. Anderson and S. R. Hartmann. 29 Mar 62, 1v. Research paper RJ207
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Theory), (*Nuclear spins, Solids), Decay schemes, Polarization, Relaxation time, Lithium, Protons, Iron, Impurities, Sodium compounds, Chlorides, Magnetic fields, Temperature, Fourier analysis, Integral transforms.

A discussion is given of experimental results and theoretical considerations which apply in the case of complete adiabatic demagnetization in the rotating frame (ADRF) for nuclear spin systems in solids. Although the net magnetization in this state is zero, both cw and pulse signals are predicted and readily observed at the normal resonance frequency. These signals appear to be much like the derivative of the signals observed in the normal nmr cases with amplitudes comparable to normal nmr signal amplitudes and they persist for times comparable with T1 at high fields even when the line is purely homogeneously broadened. (Author)

AD-419 636 Div. 20
OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
(No title).
Status rept. no. 8,
by S. DeBenedetti. 20 Sep 62, 3p.
Contract Nonr76020, Proj. NR018 204
Unclassified report

Descriptors: (*Single crystals, Resonance absorption), (*Resonance absorption, Iron compounds), (*Iron compounds, Resonance absorption), (*Mossbauer effect, Scientific

research), Rare earth compounds, Hyperfine structure, Gamma rays, Emissivity, Isotopes, Iodine, Samarium, Hydrates, Ammonium compounds, Sulfates, Low temperature research.

Contents: Single crystal work, Low temperature studies, Temperature dependence of quadrupole splitting of Fe-57, Mossbauer isotopes, Hyperfine structure of rare earth compounds, Mossbauer transitions, and Angular correlation of Mossbauer gamma rays.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-419 015 Div. 22
OTS price $2.60

Bureau of Mines, Pittsburgh, Pa.
HYPERVELOCITY IMPACT PHENOMENA.
Quarterly rept., 1 June-31 Aug 63.
by Richard W. Watson, Karl R. Becker, J. Edmund Hay and Frank C. Gibson. 24 Sep 63, 1v.
Unclassified report

Descriptors: (*Hypervelocity projectiles, Spallation), Impact shock, Aluminum alloys, Magnesium alloys, Steel.

Hypervelocity projectiles, having a velocity of about 9.3 km/sec at impact and a nominal mass of 4 gm, were used in order to determine the spatial distribution of spall numbers and masses as well as the relationship between various parameters and spall particle size. The study consisted of impacts into three different thicknesses of three different target materials. The target thicknesses were 1/8 in, 1/2 in, and 2 in; the target materials were 2024-T3 aluminum, AZ31BH-24 magnesium, and 4130 steel. The spall particles were recovered from a target consisting of a stack of 1/2-inch thick fiberboard sheet; the witness target is located ten inches beyond the metal target. (Author)

AD-419 053 Div. 22
OTS price $4.60

Naval Ordnance Lab., White Oak Md.
ADAPTATION OF CONTINUOUS WIRE METHOD FOR MEASURING TRANSIENT PHENOMENA.
Progress rept.
by Irving Jaffe and Donna Price. Sep 63, 43p.
FR59 and NOL323
NOL TR63 136 Unclassified report

Descriptors: (*Detonations, Resistance (Electrical)), (*Explosive materials, Detonations), Deflagration, Test methods, Instrumentation, Electrical conductance, Propellants, Wire, Charges (Explosive), TNT, RDX, Waxes, Pentolite, Oscillographs, Castings, Solid rocket propellants.

The development of a continuous ionization sensor which can be used to study detonation and predetonation phenomena in solid propellants and explosives is discussed. The system described is capable of following the progress of an ionized front down a charge and at the same time it measures the resistance or conductance of the front. During the evaluation of the technique, a number of explosives were used (TNT, Comp B, Pentolite). The results are discussed qualitatively. (Author)

AD-419 220 Div. 22
OTS price $1.25

Naval Ordnance Lab., White Oak, Md.
RDX/CALCIUM-STEARATE BINARY SYSTEM EXPLOSIVE SENSITIVITY CALIBRATION,
by J. N. Ayres and C. W. Randall. 15 May 63, 19p.
NOL TR63 91 Unclassified report

Descriptors: (*Explosive materials, Sensitivity), RDX, Calcium compounds, Mixtures, Safety, Explosive trains, Detonations, Fatty acid esters, Fatty acids, Calibration.

The Small Scale Gap Test sensitivity and output of RDX/Calcium-Stearate mixtures ranging from 0.59% to 23.75% Calcium Stearate were determined for 4, 8, 16, 32 and 64 KPSI consolidating pressures. By choice of pressure and composition changes can be made with sensitivities from 3.4 to 7.8 DBg shock sensitivities. Although these mixtures can be used to satisfy the immediate needs for explosives for the VARICOMP measurement of weapon explosive train safety and reliability, explosive systems should be developed wherein composition control to obtain specific sensitivity and output is less critical. (Author)

AD-419 240 Div. 22
OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
ELASTIC COMPLIANCES OF CYLINDRICALLY AEOLOTROPIC PLATES,
by W. H. Hoppmann II and I. A. Minkarah. Sep 63, 26p.
Contract DA30 069AMC195R
Unclassified report

Descriptors: (*Sheets, Loading (Mechanics), (*Stresses, Mathematical analysis), Metal plates, Cylindrical bodies, Differential equations, Simultaneous equations, Deflection, Elasticity.

An experimental method for the determination of the elastic compliances of cylindrically aeolotropic plates was developed. It consists in subjecting a simply supported circular plate to a concentrated transverse load and measuring deflections at appropriate locations. Substitution of the measured deflections into the solution of the differential equation of flexure of the plate provides a set of simultaneous algebraic equations for the determination of the compliances. As an illustration of the method, the equivalent elastic compliances for a circular aluminum plate reinforced with circular stiffeners of the same material were determined. The results are presented in the form of Curves and Tables. (Author)

AD-419 367 Div. 22
OTS price $13.50

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
SHORT RANGE ELECTRONIC POSITIONING EQUIPMENT (SREPE),
by George P. Schreiber, Jr. 17 Jan 63, 192p.
Proj. 2S3012 01, Task 1S6 43315D578 10
GIMRADA TR9TR Unclassified report

Descriptors: (*Fire control computers, Surveying), (*Radio equipment, Position finding), Mapping, Arctic tests, Tests, Artillery, Portable (Man-portable).

Division 23 - PERSONNEL AND TRAINING

This report covers the development and Engineering Tests of the Short Range Electronic Positioning Equipment (SREPE) conducted by USAEGIMRADA in the Northern Virginia Test Area, at USAERDL, Ft. Belvoir, Virginia; and at the Arctic Test Facilities at Ft. Greely, Alaska. The primary objective of this development was the provision of an all-weather, day-night, highly portable system for determining survey positions, specifically for use by Artillery units operating within the 10- by 10-mile area concept of the Artillery Survey System. The equipment as tested will enable an unlimited number of passive, manportable receivers to receive signals transmitted from the base stations which can be converted to UTM coordinates of each receiver either by plotting at the site or by a FADAC computer at some convenient location. Erroneous positional data may result through poor site selection with respect to the proximity and orientation of local conductors such as power lines, telephone lines, and wire fences. Furthermore, the system can be jammed by a radiator of sufficient power and proximity within 50 cycles of the assigned frequency for the base station transmitters. (Author)

AD-419 449 Div. 22, 9
OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SHOCK WAVE PROPAGATION IN SOLIDS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Peter R. Stromer. Mar 63, 61p. Special bibliography no. SB63 31; Rept. no. 8 40 63 6
Contract NOw63 0050C
Unclassified report

Descriptors: (*Shock waves, Bibliographies), (*Bibliographies, Shock waves), Propagation, Solids, Blast, Impact shock, Plasticity, Viscoelacticity, Elasticity, Jets, Compressive properties.

A bibliography has been compiled on shock wave propagation in solids. The effects of explosive blast waves and/or hypervelocity impact on plastic, viscoelastic, and elastoplastic solids have also been included. A detailed subject index is provided. (Author)

AD-419 534 Div. 22
OTS price $.50

Federal Aviation Agency, Washington, D. C.
PROJECT SEDAN.
Preliminary and final rept.,
by Stuart Halsey. 17 Apr 63, 9p.
FAA PNE205F Unclassified report

Descriptors: (*Air traffic control systems, Detonations), Nuclear explosion, Flight paths, Tracking, Bibliographies.

AD-419 535 Div. 22
OTS price $.50

Bureau of Mines, Oakland, Calif.
STRUCTURAL SURVEY OF PRIVATE MINING OPERATIONS.
Final rept.
5 Nov 62, 10p.
AEC PNE204F Unclassified report

Report on Proj. SEDAN.

Descriptors: (*Underground structures, Nuclear explosion damage), Mining engineering.

A survey was made to document the pre-event and post-event physical condition of all existing privately-owned mining properties that might conceivably sustain physical damage from the Sedan event. (Author)

AD-419 537 Div. 22
OTS price $.50

Edgerton Germeshausen and Grier, Inc., Boston, Mass.
TIMING AND FIRING.
Final rept.
Mar 63, 9p.
AEC PNE233F Unclassified report

Report on Proj. Sedan.

Descriptors: (*Firing tests, Nuclear explosions), (*Detonations, Time), Time signals, Monitors, Tables, Bibliographies.

AD-419 590 Div. 22
OTS price $2.60

Watervliet Arsenal, N. Y.
HEAT TRANSFER STUDY OF SIMULATED MORTAR TUBES,
by H. Frankel and L. Liuzzi. July 63, 27p.
WVT Technical rept. 11 6312
Unclassified report

Descriptors: (*Mortars, Heat transfer), (*Gun barrels, Cooling), Simulation, Surfaces, Convection, Heat exchangers, Fins.

Equilibrium temperature measurements were made on several simulated mortar tubes to determine the effect of various surface configurations on heat dissipation. The most effective heat dissipation was obtained with fins machined into the solid steel. A finned aluminum jacket caused an increase in the equilibrium temperature of the base steel due to an air gap between the two metals. (Author)

23. PERSONNEL AND TRAINING

AD-419 018 Div. 23
OTS price $2.75

Behavioral Sciences Lab., Aerospace Medical Div. Wright-Patterson Air Force Base, Ohio.
A METHODOLOGICAL APPROACH TO THE ANALYSIS AND AUTOMATIC HANDLING OF TASK INFORMATION FOR SYSTEMS IN THE CONCEPTUAL PHASE,
by Lawrence E. Reed, John P. Foley, Jr., Ralph S. Graham and Jonathan B. Hilgeman. Aug 63, 120p.
Proj. 1710, Task 171006
AMRL TDR63 78 Unclassified report

Descriptors: (*Job analysis, Scientific research), Data processing systems, Human engineering, Behavior, Coding, Training, Personnel, Information retrieval.

Adequate consideration of the human skills required by future systems has long been neglected in the conceptual phase of man-machine system development. This neglect in part has been due to lack of a uniform and workable method for gathering, processing, and using early human factors information for improving the design and development of systems. The methodological approach presented in this report was predicated on this need. This report presents a technique for analyzing and processing task and task requirements data generated during the conceptual phase of system development. The technique includes: (a) a category system for organizing, classifying, and coding task information; (b) a task analysis format for recording and coding

task descriptions and task requirements; and (c) computer update and retrieval programs. Task requirement data appearing in documents resulting from the Air Force Study Requirement program are analyzed and used for testing the technique on an actual personnel training problem. The test program indicates that the technique can be used to assist human factors specialists to isolate and process task and task requirements associated with advanced systems for making personnel, training, and training equipment recommendations. (Author)

AD-419 027 Div. 23
OTS price $7.60

American Inst. for Research, Pittsburgh, Pa.
THE RECRUITMENT, SELECTION, AND TRAINING OF SHELTER MANAGERS AND CORE STAFFS,
by Max U. Eninger and John R. Fetter. Sep 63, 139p.
Contract OCD OS 62 184
Unclassified report

Descriptors: (*Management engineering, Shelters), (*Shelters, Management engineering), Recruiting, Selection, Training, Job analysis.

The study explores the need for a peacetime shelter management cadre. The principal method is a systematic analysis of the goals of a fallout shelter as a system and the enfolding of the implications of those goals for shelter management activities. It is concluded that a peacetime shelter cadre is necessary for establishing and maintaining the operational readiness of the shelter. Based upon analysis of shelter management activities, prototype management organization plans are proposed. The basic qualifications of key management cadre positions are described. Occupations are identified from which qualified cadre members are most likely to be obtained. Recruitment criteria are established and applied to potential recruitment methods. The criteria rule out traditional recruitment methods. An analysis shows how community influence structures can be used to facilitate recruitment of basically qualified personnel. Selection criteria are established and applied to potential selection methods. The criteria rule out many traditional selection methods. The training of a shelter management cadre in peacetime is discussed in terms of: (1) content selection, (2) methods of training, (3) whom to train, (4) when to train, and (5) where to train. Also discussed are the problems of obtaining instructors, evaluating the training, and administering the training. (Author)

AD-419 265 Div. 23
OTS price $9.10

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). PART II. ASSOCIATE CONTRACTOR INDOCTRINATION/TRAINING EQUIPMENT PLAN,
by Gerald M. Campbell. 20 Sep 63, 1v. Rept. no. MPO SR13 3 301
Contract AF04 694 261
Unclassified report

Descriptors: (*Maintenance personnel, Training), (*Ground support equipment, Maintenance), (*Training devices, Handbooks), (*Training, Test methods), Test equipment (Electronics).

AD-419 678 Div. 23, 8
OTS price $6.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A MULTIDIMENSIONAL SCALING ANALYSIS OF THE CIRCUIT TYPES REPAIRED BY NAVAL AVIATION ELECTRONICS TECHNICIANS,
by Douglas G. Schultz and Arthur I. Siegel. July 63, 53p.
Contract Nonr227900
Unclassified report

Descriptors: (*Job analysis, Naval personnel), (*Circuits, Classification), (*Maintenance, Electronics), (*Test construction (Psychology), Factor analysis.

This is the third in a series of studies investigating the applicability of multidimensional scaling techniques in the job performance area. In this study, the circuits repaired by Naval aviation electronics technicians in the performance of their duties were used as the stimulus materials. Similarity judgments among the circuit pairs were made by supervisory personnel and analyzed by multidimensional scaling methods. It is concluded that it is feasible and fruitful to apply multidimensional scaling techniques to the classification of electronic circuits worked on in the performance of Naval jobs. The avionic circuits repaired by Naval aviation electronics technicians, as represented in the circuit list developed in the study, were perceived as involving sixteen underlying dimensions. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-419 043 Div. 24, 6, 18
OTS price $7.60

RCA Defense Electronic Products, Princeton, N. J.
RESEARCH AND DEVELOPMENT ON PHOTO-CONDUCTIVE PHOTO-TAPE.
Interim rept. no. 1.
Sep 63, 66p.
Contract AF33 657 11485, Proj. 6263, Task 626302
Unclassified report

Descriptors: (*Optical images, Dielectric recording systems), (*Electrooptical photography, Reconnaissance satellites), Tapes, Data storage systems, Electrostatic fields, Input-output devices, Electrostatics, Data processing systems, Photoconductivity, Electron beams, Electron guns, Electron optics, Resolutions, Television cameras, Feasibility studies, Test facilities.

An engineering report is presented on a program directed toward the development of techniques and demonstration equipment for a system to store optical images of electrostatic charges distributed on a tape. This program is divided into two primary areas, the first of which is the demonstration of specified performance levels in terms of available hard-copy records out of the reproducer, using the laboratory models available. The second is to demonstrate the feasibility of building higher-performance cameras based on the Photo-Tape concept by employing laboratory models of individual components. Research is summarized concerning electron optics, photoconductors, electron guns, and development of demonstration model cameras. (Author)

AD-419 385 Div. 24

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ANALYSIS OF MOVEMENTS BY MEANS OF LUMINOUS FLASHES,

by F. Frungel and W. Thorwart. 13 Sep 63, 13p.
RSIC 67 Unclassified report

Trans. from Mesures, 26:28, pp. 787-802, 1961.

Descriptors: (*Photographic analysis, Motion), (*High-speed photography, Motion), (*Luminescence, Flash lamps), Test equipment, Flash radiography, Test methods, Combustion, Recombination reaction, Electronic equipment, Vibration.

By transforming the electrical impulses into successions of high tension flashes of high frequency, one obtains an indicator, free of mass and inertia, in the form of a spark curtain. Vibrations of air and flow of literally any form or shape can be photographed with extreme precision thanks to the fact that flash frequencies can be controlled by quartz. One special application of this technique of luminous flashes consists of cinematography of dynamic tensions in photo-elastic models. (Author)

AD-419 672 Div. 24, 32
OTS price $9.10

Aero Service Corp., Philadelphia, Pa.
ENGINEERING STUDY TO ADAPT SUR/FAX TO PHOTOGRAPH FLEXIBLE AIRFIELD PAVEMENTS.
4 Dec 61, 29p.
Contract NBy37609
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Airports, Runways), (*Runways, Photographic recording systems), Pavements, Continuous strip cameras, Photogrammetry, Photographic images, Photo interpretation, Design, Maintenance, Costs.

An investigation and development program is reported, conducted to modify or further develop the Sur/Fax system of pavement condition photography so it would faithfully record in a form highly usable for analysis and record purposes, cracking, rutting, raveling, bleeding and such other flexible airfield pavement defects or characteristics as would be of interest to pavement engineers of the Navy Bureau of Yards and Docks. In general, the investigation and development was concerned with such factors as film types, lighting, subject enhancement techniques, vehicle speed, film travel, data reduction, positional control, and techniques for obtaining three-dimensional records. The individual and combined effects of these factors were studied in the light of their providing a record of flexible pavement defects which was superior and more useful than the initial Sur/Fax record. The results of this investigation and development program have led to the preliminary design of a modified Sur/Fax system which will secure the desired data on flexible airfield pavements. (Author)

25. PHYSICS

AD-419 021 Div. 25
OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
AN INSTRUMENT FOR MEASURING THE SPECTRAL EMITTANCE OF A SOLID IN THE INFRARED FROM 16 TO 45 MICRONS AT LOW TEMPERATURES,
by D. L. Stierwalt, D. D. Kirk and J. B. Bernstein. 15 Aug 63, 17p.
NOLC 589 Unclassified report

Descriptors: (*Spectrophotometers, Design), (*Emissivity, Solids), Temperature, Theory, Optical equipment, Optical instruments, Gases, Liquids, Prisms, Mirrors, Infrared radiation.

As part of a continuing research project for measuring the emittance of solids, a Beckman IR-3 spectrophotometer has been modified. This modification permits the measurement of spectral emittance of solids in the 16 to 45 microns region in the temperature range between 77 and 473 K. (Author)

AD-419 024 Div. 25
OTS Price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF A SINGLE POINT ON THE HUGONIOT SOLID EQUATION OF STATE CURVE,
by George Philip Crotwell. Aug 63, 82p.
AFIT GNE/PHYS/63 6 Unclassified report

Descriptors: (*Impact shock, Pressure), (*Materials, Compressive properties), Quartz, Transducers, Shock waves, Piezoelectric effect, Thickness, Propagation, Equations of state, Errors, Deceleration, Analysis, Velocity Measurement.

The Hugoniot solid equation of state curve is the curve of pressure and compressibility for a sample material. Compressibility, n, is the ratio of the densities of the shocked material to that of the shock-free material. The shock wave creating the pressure is produced by forcing an aluminum sabot down the barrel of a light gas gun to impact on a pressure transducer. The light gas gun has the desirable ability to reproduce sabot velocities and to produce planar impacts. The theory behind the experiments is in two parts. One part relates the pressure produced on impact to compressibility, and the other relates the pressure incident on the transducer to its electrical output. (Author)

AD-419 025 Div. 25
OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Calif.
DETERMINATION OF ELECTRON ENERGY DISTRIBUTION IN AN ARGON RF PLASMA,
by Raymond Thomas Beurket, Jr. Aug 63, 82p.
AFIT GNE/PHYS/63 3 Unclassified report

Master's thesis.

Descriptors: (*Plasma medium, Radio frequency), (*Gas ionization, Argon), (*Electrons, Energy), Distribution, Excitation, Lasers, Electric fields, Probes (Electromagnetic), Measurement, Design, Coils.

Electron energy distribution measurements were determined in an RF excited plasma and are feasible if the plasma is excited by a cylindrical coil fed push-pull from a balanced power source and if probe measurements are made along the axis of the coil. As far as is known, the measurements made during this investigation are the first energy measurements made in an RF plasma. The basic theory of plasma generation and general probe theory were reviewed; Medicus' spherical probe theory was used in making the determinations. Experimental equipment was designed and built and suggestions for improvement were made. The results indicated that in the argon RF plasma of this investigation, the energy distribution is markedly non-Maxwellian. (Author)

AD-419 034 Div. 25, 17
OTS Price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
PRESSURIZED RING-REINFORCED OVAL CYLINDER-COMPARISON OF THEORY AND DTMB TESTS,
by Joseph Kempner, William P. Vafakos and Neil Nissel. Sep 63, 14p. PIBAL rept. no. 671
Contract Nonr83914, Proj. NR064 167
Unclassified report

Descriptors: (*Stiffened cylinders, Stresses), Ellipsoids, Theory, Hydrostatic Pressure, Rings, Reinforcing materials, Structural shells, Equations, Deflection, Cylindrical bodies.

Theoretical results for the stresses occuring in a ring-reinforced oval cylindrical shell subjected to a hydrostatic pressure are compared with corresponding test results recently published by the David Taylor Model Basin. The cylinder treated is composed of two different skin thicknesses. The theoretical results are obtained by using the local skin thickness of the cylinder in solutions developed for ring-reinforced short oval cylinders of uniform thickness. Good agreement is shown to exist between the results of theory and test for all circumferential stresses and for the axial bending stresses, but not for the axial membrane stresses. It is indicated that the solution based upon using the local skin thickness can not be expected to yield accurate results for these latter stresses. However, these can be shifted towards the test results by applying a simple one-dimensional correction. (Author)

AD-419 055 Div. 25
OTS price $3.60

Naval Armament Maintenance Establishment, Netherlands.
DIFFERENTIAL THERMAL ANALYSIS AS APPLIED TO THERMAL ENDURANCE OF DIELECTRICS.
Progress rept. no. 1
by J. P. Randino and J. R. Andreotti. 30 Oct 63, 1v.
Task 1050
NASL Lab. Proj. 6406 Unclassified report

Descriptors: (*Dielectrics, Degradation), (*Electric Insulation, Degradation), (*Thermodynamics, Dielectrics), Chemical reactions, Oxygen, Test methods, Test equipmemt, Controlled atmosphere, Specific heat, Polyethylene Plastics, Phenolic plastics.

Research was conducted to develop a rapid and inexpensive means for the temperature classification of dielectrics. An oxygen injection differential thermal analysis method was developed which provided for the obtaining of life-temperature plots in a much shorter time than existing thermal endurance methods. The new method is applicable to materials whose deterioration at elevated temperatures is caused by a reaction with atmospheric oxygen. Results of the new method correlate well with those of existing thermal endurance method for materials investigated. (Author)

AD-419 062 Div. 25, 8
OTS price $3.60

Harry Diamond Labs., Washington, D. C.
CALCULATIONS OF RELAXATION OSCILLATIONS IN GAS TUBE CIRCUITS,
by Alford L. Ward and Larry G. Schneekloth.
28 Aug 63, 41p.
HDL Proj. 96600
HDL TR1166 Unclassified report

Descriptors: (*Relaxation, Electron tubes, oscillators), (*Circuits, Relaxation oscillators), Gases, Electric potential, Electric currents, Equation, Negative resistance circuits, Boundary value problems, Frequency, Oscillations, Argon, Hydrogen.

Temporal voltage-current dynamic characteristics were computed using the Townsend continuity equations and Poisson's equation, with suitable initial and boundary conditions. In the current region of the negative static characteristic, small current perturbations initially grow exponentially in time if the external-circuit time constant is greater than the tube current-growth time constant. In a limited range of applied voltages, these oscillations become precisely repetitive in time, corresponding to the well known relaxation oscillations. The frequencies of the oscillations obtained from these calculations agree with those measured at HDL more closely than do those obtained from the traditional published formula. The inductances and the negative resistances calculated from small-amplitude decaying oscillations agree precisely with those calculated using a sinusoidal incremental applied voltage of the same frequency and average current. Qualitative agreement is also obtained with laboratory measurements of those quantities. Relaxation oscillations are also calculated using voltages that closely approximate the peaks of 60-cps applied voltages. Most of the calculations presented are for an argon gap of 1 gm and for a pressure of 2 torr. Experimental data are presented for both argon and hydrogen. (Author)

AD-419 067 Div. 25
OTS price $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
TOTAL HEMISPHERICAL EMITTANCE MEASUREMENTS OVER THE TEMPERATURE RANGE 77 K TO 300 K,
by R. J. Jenkins, C. P.J Butler and W. J. Parker.
6 Aug 63, 57p.
Task 504324B0
NRDL TR663 Unclassified report

Descriptors: (*Blackbody radiation, Paints), (*Emissivity, Blackbody radiation), (*Paints, Thermal conductivity), Temperature, Thickness, Aluminum, Measurement Coatings, Platinum, Metal coatings.

Total hemispherical emittance measurements were made on a series of high emittance black paints, metal blacks and anodized aluminum over the temperature range from 77 K to 300 K by measuring the rate of temperature decay of a coated disk in a vacuum. Analytical and experimental analysis show that errors inherent in the method are less than 1% of the emittance of a black body at the temperature of the measurement, although instrumental errors and uncertainties in the heat capacities of the specimens reduce the accuracy of the reported data to ±10%. The blackest material measured was electrically deposited platinum black on gold. The emittance of a black paint appeared to be more dependent on the thickness that it could be applied than on the specific type of paint. Heavily anodized aluminum exhibited an emittance near 77 K of about 0.6, nearly as high as the best black paints, although it looked bright to the eye. The best platinum black coating had an emittance above 0.9 at 77 K. The metal blacks and the black paints had emittances above 0.95 at room temperature. (Author)

AD-419 069 Div. 25
OTS price $11.00

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF PHOTOMETRIC DATA RECEIVED FROM AN ARTIFICIAL EARTH SATELLITE,
by Eugene Michael Vallerie III. Aug 63, 94p.
GA Phys 63 13
Unclassified report

Masters Thesis.

Descriptors: (*Satellite attitude, Light), (*Light, Intensity), Photometers, Satellites (Artificial), Rotation, Optics, Optical tracking.

A theory is developed relating the axis of rotation about the center of mass and the orientation of the longitudinal axis of a cylindrical satellite to the variation in light intensity observed by a tracking station. Photometric recordings of the light data received from an artificial earth satellite are made using the equipment at the USAF Sulfur Grove, Ohio tracking station. The theory is applied to the experimental data received from revolution 257 of satellite 1962 Beta Alpha 2, an Agena B rocket body. The right ascension and declination of the axis of rotation and the longitudinal axis of this satellite are found. Using the orientation of the longitudinal axis found by the developed theory, the variation of light intensity due to orientation is calculated. (Author)

AD-419 077 Div. 25
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
PHASE TRANSITIONS IN HEXAFLUOPHOSPHATE SALTS,
by K. Vedam, R. Pepinsky, Joseph Lajzerowicz, Y. Okaya and N. Stemple. 31 Jan 59, 1p.
Contract AF18 603 35
Unclassified report

Abstract for American Physical Society, New York Meeting, January 28-31, 1959.

Descriptors: (*Ammonium compounds, Phosphates), (*Fluorine compounds, Phosphates), (*Phase studies, Fluorine compounds), Dielectric properties, Crystal lattices, Ferroelectric materials, X-ray diffraction analysis.

AD-419 078 Div. 25
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
FERROELECTRIC BEHAVIOR OF NH4FE(SO4)2 x 12H2O,
by F. Jona, K. Vedam, T. Mitsui and R. Pepinsky.
27 Apr 57, 1p.
Contract AF18 603 35
Unclassified report

Abstract for American Physical Society, Washington Meeting, April 25-27, 1957.

Descriptors: (*Ferroelectric crystals, Dielectric properties), Ammonium compounds, Transition temperature, Iron compounds, Sulfates, Hydrates, Abstracts, Cryogenics.

AD-419 084 Div. 25
OTS price $7.60

Pennsylvania State U., University Park.
(No title).
Technical rept., 1 June 62-30 Sep 63,
by D. H. Rank. 30 Sep 63, 1v.
Contract Nonr65612, Proj. NR014 401
Unclassified report

Descriptors: (*Molecular properties, Research program administration), Spectroscopy, Quadrupole moments, Hydrogen, Chlorides, Pressure, Iodine, Frequency, Gases, Absorption spectrum, Line spectrum, Molecular spectroscopy.

Contents:
Quadrupole Spectrum of Molecular Hydrogen
Collision Narrowing of Spectral Lines
Experimental Measurements of Spectral Line Profiles
Gas Phase Complexes in Hydrogen Chloride
Pressure Induced Shifts of Molecular Band Lines
Molecular Constants of the Ground State of I2

AD-419 092 Div. 25, 15, 7
OTS price $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE SYNTHESIS OF RESISTOR N-PORTS,
by Francis T. Boesch. 23 Apr 63, 54p. Research rept. PIBMRI1143 63
Contracts AF30 602 2213 and AF30 602 2868
RADC TDR63 294 Unclassified report

Descriptors: (*Matrix algebra, Theory), (*Electrical networks, Combinatorial analysis), Topology, Transformations, Transformers, Resistors, Admittance, Functions, Equations, Synthesis, Inequalities, Electrical conductance, Electric terminals.

The problem of determining the necessary and sufficient conditions for a symmetric matrix to be the short-circuit admittance matrix of a transformerless resistor n-port is a classic problem in network theory. The problem is formulated topologically, and it is shown that it can be related to the well known solution for the realization of a nodal admittance matrix. In fact, the short-circuit admittance matrix and the nodal admittance matrix are shown to be related by a congruence transformation which is uniquely defined by the topology of the ports. In the special case of an n+1 terminal realization, this transformation becomes the Kron transformation. The problem of realizing a given symmetric matrix is, therefore, reduced to the determination of the configuration of port voltages. It is shown that the n+1 terminal case is identical to the problem of realizing a given matrix as a fundamental cut-set matrix, i.e., finding a graph which has a fundamental cut-set matrix such that it is equal to the given matrix. The n+1 terminal case is studied in detail, and a simple procedure for determining the topology of the port voltages from a given matrix which contains no zero elements is derived. This synthesis procedure has the advantage of being direct, and it proceeds almost by inspection. A number of examples are given which illustrate the relative simplicity of this technique, and the synthesis of three ports is considered in detail. (Author)

AD-419 105 Div. 25
OTS price $2.60

Brandeis U., Waltham, Mass.
A STATISTICAL THEORY OF THE HYDROGEN MOLECULE-ION,
by Sidney Golden and Judith G. Chernin.
15 Sep 63, 16p. Technical rept. no. 9
Contract Nonr167701, Proj. NR051 362
Unclassified report

Descriptors: (*Hydrogen, Statistical analysis), (*Atomic orbitals, Hydrogen), Molecules, Ions, Chemical bonds, Energy, Atomic structure, Electrons, Equations of state.

A version of statistical theory is applied to the hydrogen molecule-ion, with good results for the electronic energies of the lowest attractive and repulsive states. For the former, a binding energy of 0.085 a.u. is obtained with an internuclear distance of 2.10 a.u., to be compared with 0.103 a.u. and 2.00 a.u. obtained from the exact solution of Schroedinger's equations. The method employed involves the use of hydrogen atomic orbitals, although when the latter refer to unbound states they are approximated by plane waves. (Author)

AD-419 117 Div. 25
OTS price $8.10

Technische Hochschule, Stuttgart (Germany).
TRANSIENT DISCHARGES IN WHIRL STABILIZED ARCS.
Final rept.,
by K. H. Hocker, M. Mailander, E. Pfender, H. Schrade and H. P. Streible. June 63, 79p.
Contract AF61 052 590, Proj. 7073, Task 7073 01
ARL 63 105 Unclassified report

Descriptors: (*Plasma medium, Gas discharges), (*Probes (Electromagnetic), Measurement), Electric fields, High-temperature research, Discharge tubes, Spectroscopy, Spectra (Visible and ultraviolet), Argon, Spectrographic cameras, Calibration, Electrons, Ions, Temperature, Photographic analysis, Image tubes, Electric arcs, Nitrogen, Hydrogen.

Experiments were conducted to study the problem of heating and stability of pulsed discharges. In order to have reproducible conditions and defined geometry a predischarge representing a highly ionized plasma was used and described. Then, the basic equations for the heating process which were developed in our institute and the main features of a model which allows to apply them to a cylindrical discharge are summarized. (Author)

AD-419 133 Div. 25
OTS Price $2.60

Dewey, G. C., and Co. Inc., New York.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF RADIATION ON THE PROPOGATION OF ELECTROMAGNETIC SIGNALS IN AIR.

Quarterly progress rept. no. 6, 1 Oct-31 Dec 62, by M. N. Hirsh and P. N. Eisner. 31 Dec 62, 26p. Rept. no. R146 6
Contract DA36 039SC87318
Unclassified report

Descriptors: (*Radio signals, Propagation), (*Radar signals, Propagation), (*Radiation effects, Air), Electron beams, Gases, Electrons, Gas ionization, Cavity resonators, Atmosphere.

A technique has been developed for measuring thermal electron processes in gases in a steady-state experiment obviating the need to make transient measurements in the afterglow. 1.5 MeV electrons from an accelerator irradiate the gas uniformly, producing ions and secondary electrons which are rapidly thermalized by gas collisions. The gas is contained in a 710 liter cylindrical rf cavity resonant in the TE sub 011 mode at 390 Mcps to permit microwave diangostics. The large cavity size minimizes wall effects, and ultra-high vacuum techniques safeguard gas purity. Preliminary measurements of steady-state ionization made in oxygen will be presented. The data yield an electron removal process linear in electron density, and varying with the square of the gas pressure with the rate coefficient 1. 9x10 to the-30 power cm to the 6th power / sec. This is identified as three-body attachment of electrons to O sub 2 in view of the agreement with published values for this rate coefficient.(Author)

AD-419 151 Div. 25, 30
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
SCADAC: SINGLE-CRYSTAL AUTOMATIC DIFFRACTOMETER AND ANALOGUE COMPUTER FOR X-RAY ANALYSES,
by Ray Pepinsky. 27 May 59, 2p.
Contract AF18 603 35
Unclassified report

Abstract for International Crystallographic Convention, Leningrad, USSR, May 21-27, 1959.

Descriptors: (*Single crystals, Diffraction), (*Analog computers, Data processing systems), X-ray diffraction analysis, Crystal structure, Diffraction analysis, Abstracts.

AD-419 162 Div. 25, 30
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
TWO INSTRUMENTAL SYSTEMS FOR AUTOMATIC DIFFRACTION DATA COLLECTION FROM SINGLE CRYSTALS,
by R. Pepinsky, K. Drenck, H. Diamant, and B. C. Frazer. 12 June 59, 4p.
Contract AF18 603 35
Unclassified report

Abstract for Stockholm Meeting, Commission on Instrumentation, International Union of Crystallography, June 10-12, 1959.

Descriptors: (*Single crystals, Phase studies), (*Computers, Phase studies), (*Diffraction analysis, Single crystals), Automatic, Crystals, Crystal structure, Test methods, Instrumentation, X-ray diffraction analysis.

AD-419 170 Div. 25
OTS price $1.60

Electron Tube and Microwave Lab., Calif. Inst. of Tech., Pasadena
THE LOW DENSITY PLASMA SHEATH IN CYLINDRICAL GEOMETRY,
by Jerald V. Parker. Dec 62, 13p. TR 19
Contract NONR 22013
Unclassified report

Descriptors: (*Plasma physics, Electron density), (*Electron density, Plasma physics), Differential equations, Integration, Ions, Density.

AD-419 191 Div. 25, 2
OTS price $2.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
TIME-FREQUENCY SIGNATURES THROUGH OPTICAL DIFFRACTION SCANNING,
by Philip L. Jackson. Sep 63, 21p. Rept. no. 4596 17R
Contract AF49 638 1078, ARPA Order 292
Unclassified report

Descriptors: (*Optical scanning, Diffraction), (*Earthquakes, Seismic waves), Explosions, Recording systems, Frequency, Time, Light, Optical equipment, Measurement.

An optical scanning method has been developed to present frequency content as it occurs and changes throughout a variable-density seismogram. Energy distributions are shown in both frequency and time. A two-dimensional pattern is presented which can be visually evaluated, and is suitable for numerical measurement. The report describes and discusses the method, and gives illustrative examples. It also describes a similar scanning method by which seismic wave dispersions can be revealed and measured. (Author)

AD-419 197 Div. 25, 4
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
A NEW CLASS OF FERROELECTRICS: ACID SELENITES,
by R. Pepinsky, K. Vedam, Y. Okaya, and F. Unterleitner. 31 Jan 59, 1p.
Contract AF18 603 35
Unclassified report

Abstract for American Physical Society, New York Meeting, January 28-31, 1959.

Descriptors: (*Ferroelectric materials, Selenium compounds), (*Abstracts, Ferroelectric materials), (*Selenium compounds, Ferroelectric materials), Acids, Hysteresis, Temperature, Selenium compounds, Oxides, Lithium compounds, Hydrides, Sodium compounds, Crystal structure.

AD-419 199 Div. 25
OTS price $6.60

Electronics Research Labs., Columbia U., New York.
EFFECTS OF MECHANICAL AND THERMAL ELECTRODE PROPERTIES ON THE BEHAVIOR OF THE FLUID TRANSPIRATION ARC,
by C. Sheer, J. M. Kennedy and P. S. Tschang. Aug 63, 58p.
Contract AF33 657 8868, Proj. 7063, Task 7063 03
ARL 63 150 Unclassified report

Descriptors: (*Electric arcs, Electrodes), Fluids, Porous metals, Direct current, Power, Energy, Fluid flow, Anodes, Materials, Gas flow, Permeability, Thermal conductivity.

The over-all objective of the present studies is

to construct a satisfactory working model of the transpiration of a fluid medium through a porous anode into a DC electric arc. The emphasis is on the effects of electrode and working fluid properties on the energy transfer and arc characteristics under different conditions of transpiration flow rate and arc power. The experimental work described includes physical characterization of several chosen porous anode materials in terms of porosity, pore structure, gas flow permeability, thermal conductivity, and local flow field studies. The construction of a flexible fluid transpiration arc test equipment is presented. The first approach to the analytical studies of fluid transpiration cooling is described. (Author)

AD-419 217 Div. 25
OTS price $4.60

Brandeis U., Waltham, Mass.
ELECTRON PARAMAGNETIC RESONANCE OF IMPURITIES OF SINGLE CRYSTALS AND OF SULFUR MONOXIDE.
Final technical rept., 1 June 61-31 May 63,
by Paul B. Dorain. July 63, 35p.
Contract AF33 616 6401, Proj. 7885, Task 7885 03
ARL 63 126 Unclassified report

Descriptors: (*Single crystals, Impurities), (*Paramagnetic resonance, Single crystals), (*Sulfur compounds, Oxides), Electrons, Rhenium, Cadmium, Silver, Copper, Potassium compounds, Platinum compounds, Chlorides, Cadmium compounds, Sulfides, Sodium compounds, Fluorides, Lithium compounds, Magnetic fields, Rotation, Spin, Crystal lattices, Monoxides.

This is the final technical report on the theoretical and experimental properties of impurity ions in crystal lattices. The electron paramagnetic resonance experiments on Re(+4) in K2PtCl6, Cd(+2) in CdS, Ag(+2) in NaF and Cu(+2) in LiF are discussed. In addition the results for the electron paramagnetic resonance of SO are given along with a preparation of single crystals of CdO. (Author)

AD-419 249 Div. 25, 9
OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE AERODYNAMIC HEATING OF A COMPOSITE FLAT PLATE,
by James L. Rand. Oct 63, 1v.
NOL Ballistics Research rept. 113; TR 63 163
Unclassified report

Descriptors: (*Flat plate models, Aerodynamic heating), (*Aerodynamic heating, Flat plate models), Heat transfer, Models, Thermal conductivity, Boundary layer, Theory, Turbulent boundary layer, Surface properties, Temperature.

The purpose of this study was to find solutions to the heat-conduction equation in both one and two dimensions when applied to a composite flat plate. The two-dimensional model is that of two slabs with different thermal properties, in good thermal contact with each other while being exposed to the same boundary layer. The solution takes the form of Fourier series which has been found to be orthogonal with respect to a ''weighting'' function identical to the ''weighting'' function found by Mayer in the one-dimensional analysis of a composite slab. The Van Driest turbulent boundary-layer theory has been applied to the one-dimensional problem to determine the constant film coefficient boundary condition. It has been found that for those values of the Fourier modulus less than 0.1, a maximum error in surface temperature ratio of 8 percent may be expected while the temperature distribution in general is unaffected for the case considered. (Author)

AD-419 272 Div. 25
OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
RADIATIVE ENERGY TRANSFER FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE.
Technical rept.,
by R. I. Miller and T. O. Passell. 30 Apr 63, 60p.
Contract OCD OS62 135, SRI Proj. IMU4021 302
Unclassified report

Descriptors: (*Nuclear explosion, High altitude), (*Thermal radiation, Nuclear explosions), (*Wave transmission, Thermal radiation), X rays, Absorption, Atmosphere, Air, Ozone.

The thermal energy flux expected at optimally oriented surfaces at the earth's surface from nuclear bursts detonated above 50 kilometers altitude has been computed from basic physical principles. The chief principles involved are (a) absorption by the earth's atmosphere of a black-body X-ray spectrum from a point source near 10 to the 7th power degrees K; (b) heating of air to some temperature depending upon its known internal energy-temperature function; (c) radiative cooling of the heated air assuming thermal equilibrium; and (d) disposition of the radiant emission into three energy bands; cold oxygen absorption band, ozone absorption band, and the atmospheric passband. (Author)

AD-419 306 Div. 25
OTS price $12.50

Air Force Weapons Lab., Kirtland Air Force Base, N. Mex.
CALCULATION OF HIGH-ENERGY SECONDARY ELECTRON EMISSION,
by Jerry A. Sawyer. Aug 63, 165p.
AF Proj. 8812
AFSWC TDR63 50 Unclassified report

Descriptors: (*Secondary emission, Electrons), (*Electrons, Secondary emission), Atomic properties, X-rays, Gamma rays, Digital computers, Intensity, Energy, Fission.

Thin targets of low atomic number were assumed to be bombarded with 25-Mev electrons, 600-kv X rays and prompt fission gamma radiation. The resulting high-energy secondary electrons were calculated theoretically on a high-speed digital computer with respect to their intensity, energy losses, energy spectra and angle of emission spectra. The results show that 25-Mev electrons, 600-kv X rays and prompt fission gamma radiation produce a maximum efficiency of high-energy secondary-electron emission of 8.0, 0.05, and 0.3 percent, respectively. Experimental results from 25-Mev electron irradiations agree very closely with these theoretical numbers. An experiment is planned for the 600-kv X-ray radiation source. (Author)

AD-419 310 Div. 25, 15
OTS price $12.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF CONVERGENCE TECHNIQUES FOR

IMPLICIT NUMERICAL SOLUTION OF THE DIFFUSION EQUATION FOR TRANSIENT HEAT TRANSFER,
by Robert Theodore Poppe. Aug 63, 163p.
AFIT GA/Phys/63-8 Unclassified report

Master's thesis.

Descriptors: (*Heat transfer, Theory), (*Partial differential equations, Numerical analysis), Relaxation time, Optimization, Errors, Difference equations, Temperature, Operators (Mathematics), Taylor's series, Simultaneous equations, Vector analysis, Programming (Computers), Matrix algebra, Tables, Diffusion.

The practical application of two convergence techniques designed to increase the rate of convergence of the method of successive displacements (Gauss-Siedel) for the implicit numerical solution of the diffusion equation of transient heat transfer is investigated. A sample problem of determining the temperature distribution in a cube with a constant internal heat source and fixed boundary temperatures is solved to provide the necessary data. The results provide a theoretical basis for the adapted Wegstein technique. This theoretical basis brings to light the fact that successive overrelaxation and the adapted Wegstein technique are based on the same theoretical background. A procedure based on estimating the maximum eigenvalue of the method of successive displacements is used to make an approximation of the relaxation factor for successive overrelaxation. (Author)

AD-419 316 Div. 25
OTS price $7.60

IIT Research Inst., Chicago, Ill.
GAGE PLACEMENT STUDY.
Final rept., July 62-May 63,
by E. T. Selig and R. Rusin. Aug 63, 72p.
Contract AF29 601 5412, Proj. 1080, Task 108006
RTD TDR63 3024 Unclassified report

Descriptors: (*Strain gages, Measurement), (*Transducers, Motion), Soil mechanics, Stresses, Accelerometers, Density, Acceleration, Shock tubes, Clay, Pressure, Pressure gages.

A study was made of the various factors which affect the behavior of gages in soil. The ultimate objective of the study is to provide guides and recommended procedures for gage placement. Previous field and laboratory experience with stress, strain and motion measurement in soil was reviewed and a list of references provided. This was supplemented by an experimental investigation of embedded accelerometers to determine the importance of gage density and placement procedures on gage response. The most important factors influencing motion measurement appear to be (1) gage density in relation to the soil, and (2) placement conditions. Reproducibility of peak acceleration measurements was within ± 15% on the average. For a variation in accelerometer density of 55%, a 12 percent difference in peak accelerations was observed for pendulum tests in sand and a 37% difference for shock tube tests in clay. Changing the static compaction pressures for placement of gages in clay from 12 psi to 42 psi resulted in a decrease of 22% in the peak accelerations recorded. (Author)

AD-419 317 Div. 25, 12
OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.,
ABLATION OF A HOLLOW SPHERE,
by Richard F. Parisse and Jerome M. Klosner.
Aug 63, 1v. Rept. no. 670
Contract Nonr83923, Proj. NR064 433
Unclassified report

Descriptors: (*Ablation, Structural shells), (*Structural shells, Ablation), (*Spheres, Ablation), Thermal stresses, Melting, Heat shields, Aluminum alloys, Temperature, Thermal conductivity, Taylor's series, Mathematical analysis, Numerical analysis, Equations, Reentry vehicles.

The ablation characteristics of a thick walled spherical shell considering radial heat flow is investigated. The outer surface of the shell is subjected to a time-dependent, point-symmetric, radial heat input and the inner surface is insulated. The melted material is assumed to be immediately removed upon formation. Two approximate solutions to the problem are developed and compared. The first method is an adoption of Citron's solution which is based on the assumption that the temperature distribution through the thickness of the body may be expressed in a Taylor series expansion about the melting surface at any time. The second method employs the heat balance technique suggested by Goodman which satisfies the heat conduction equation on the average. Numerical calculations are performed for an aluminum sphere having a 7-3/4 inch outside diameter and a one-inch wall thickness, subjected to a constant heat flux. (Author)

AD-419 345 Div. 25
OTS price $1.10

X-ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
ON SOME OLD, NEW AND YET-UNDISCOVERED FERROELECTRICS AND OTHER INTERESTING DIELECTRICS,
by Ray Pepinsky. 1957, 1p.
Contract AF18 603 35
Unclassified report

Descriptors: (*Ferroelectric crystals, Crystal structure), Antiferroelectricity, Inorganic compounds, Abstracts.

AD-419 384 Div. 25, 4
OTS price $4.60

Washington U., Seattle.
(No title).
6 Jan 63, 1v. Technical rept. no. 12
Contract Nonr477 14, Task NR051 217
Unclassified report

Descriptors: (*Diatomic molecules, Excitation) (*Polyatomic molecules, Excitation), (*Organic compounds, Alkanes), Electron transitions, Vibration, Aliphatic compounds, Decomposition, Isotopes, Kinetic theory, Energy, Probability, Gases, Hydrogen, Nitrogen, Carbon dioxide, Halogenated hydrocarbon, Fluorine compounds, Chlorine compounds, Sulfur compounds, Fluorides, Chemical equilibrium, Reaction kinetics.

The study of collisional transitional probabilities for the de-excitation by inert gases of chemically activated sec-butyl radicals, excited to internal energies in excess of 40 kcal/mole, has been extended to H2, D2, N2, CO2, CH4, CD3F, CH3Cl and SF6. The diatomic gases display behavior similar to the rare gases, and on a preferred exponential model of collisional transition probabilities the average amount of energy transferred per collision is $\langle \Delta E \rangle$ expon approximately equal to 1.3 kcal/mole. Hydrogen

atom rupture from chemically activated ethyl-d(1) radicals has been studied and is compared with a similar reaction of ethyl-d(3) radicals. The activation reactions were D atom addition to ethylene or to trans-ethylene-d(2). A very large normal statistical intermolecular secondary kinetic isotope effect of approximately greater than D atom substituent was found. (Author)

AD-419 387 Div. 25, 4
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE RELATIONSHIP BETWEEN THE SURFACE ENERGY OF LIQUIDS AND THE ACCOMMODATION COEFFICIENTS,
by M. Baranaev, tr. by Ingeborg V. Baker.
6 Sep 63, 13p. Rept. no. RSIC52
Unclassified report

Trans. from Zhurnal Fizicheskoi Khimii, USSR, 13:11, pp. 1635-1641, 1939.

Descriptors: (*Liquids, Surface properties), (*Organic compounds, Surface properties), Condensation, Surface tension, Energy, Theory, Alcohols, Low-pressure research, Benzene, Evaporation, Halogenated hydrocarbons, Aromatic compounds, Hydrocarbons.

AD-419 389 Div. 25, 15
OTS price $4.60

Iowa State U., Iowa City.
CONTRASTS AND CONFLICTS OF S-MATRIX AND FIELD THEORY,
by M. Dresden. June 63, 48p. SUI63 21
Grant AF AFOSR62 122
AFOSR 5293 Unclassified report

Descriptors: (*Field theory, Analysis), Operators (Mathematics), Vector analysis, Equations, Transformations (Mathematics), Functions, Complex variables, Measure theory, Stability, Elementary particles, Bosons, Momentum, Integral equations, Mesons, Quantum mechanics.

The framework of the various field theories is outlined briefly. Since the motivation of the S-matrix approach stems in part from a dissatisfaction with field theory, it is important to examine the underlying assumptions of the different field theories. There is a brief description of the assumptions made by Stapp (''The Stappian Way'') in his axiomatic discussion of S-matrix theory. In addition to a description of the axioms, there are also a number of remarks, comments, and criticisms of these axioms. Special emphasis is given to the similarities and differences between these axioms and the ones adopted in the various versions of field theory. The S-matrix criticism of the notions of usual field theory is re-examined as is the manner in which the new postulates are supposed to circumvent the field theoretic difficulties. Finally, there is a collection of a number of specific and general questions which pertain to the S-matrix theory. (Author)

AD-419 395 Div. 25
OTS price $6.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
NONLINEAR INTERACTION OF A HIGH INTENSITY MICROWAVE FIELD WITH A LOW DENSITY PLASMA,
by Fedele J. Sforza. Aug 63, 59p.
Proj. 5519, Task 551902
RADC TDR63 240 Unclassified report

Descriptors: (*Plasma medium, Microwaves), Radio fields, Electron density, Gas ionization, Frequency, Differential equations.

The interaction of a high-intensity electromagnetic field of a fundamental microwave frequency with a low-density plasma slab in an infinitely-long rectangular wave guide was studied. The current density distribution induced in the plasma by the high-intensity field was obtained by solving the Boltzmann Transport equation, together with the Maxwell equations. General expressions for the fields generated in a rectangular wave guide by an arbitrary current distribution are presented from which expressions for the TM sub mn and TE sub mn modes generated by the second harmonic component of the induced current distribution are obtained. Detailed computations of the power generated in the TE11 and TM11 modes as a function of the plasma frequency for particular thicknesses of the plasma slab are presented in graphical form. Curves of the reflected power of the high intensity field from the plasma slab are also presented and compared with the second harmonic TE11 and TM11 power curves, from which a number of interesting results are deduced. (Author)

AD-419 396 Div. 25, 15
OTS price $2.60

RAND Corp., Santa Monica, Calif.
AN ANALYTICALLY SOLVABLE MODEL FOR THE ELECTROMAGNETIC FIELDS PRODUCED BY NUCLEAR EXPLOSIONS,
by W. Sollfrey. July 63, 19p. Memo RM3744PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Electromagnetic fields; Nuclear explosions), (*Mathematical models, Electromagnetic fields), Time, Electrical conductance, Gamma rays, Electrons, Magnetic fields, Electric fields, Differential equations, Partial differential equations, Functional analysis, Integral equations, Functions, Models.

A theoretical expanding electromagnetic field structure analogous to that produced by a nuclear explosion is presented. The model displays time-and-space varying conductivity and current, but can be solved analytically. There are certain long-time nonphysical effects, but the fields are plausible for an interesting portion of the time scale. (Author)

AD-419 437 Div. 25
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
COMPRESSIBILITY OF SEVERAL GASES AT 0 DEGREES AND BELOW 1 ATM., AND THEIR DEVIATIONS FROM THE LAW OF AVOGADRO,
by A. Guye and T. Batuecas. 13 Sep 63, 12p.
RSIC 66 Unclassified report

Trans. from Helvetica Chimica Acta, vol. 5, pp. 532-543, 1922.

Descriptors: (*Oxygen, Compressive properties), (*Hydrogen, Compressive properties), (*Carbon dioxide, Compressive properties), (*Gases, Compressive properties), Production, Purification, Molecular weight, Low temperature research, Pressure.

AD-419 455 Div. 25, 8
OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
MILLIMETER WAVE COMPONENT DEVELOPMENT (BEAM-PLASMA AMPLIFIER).
Rept. no. 1, 21 Feb-20 May 63,
by Paul Chorney and Grant E. St. John. Sep 63, 30p.
Contract AF30 602 2948, Proj. 5573, Task 557301
RADC TDR63 368 Unclassified report

Descriptors: (*Beams, Amplifiers), (*Amplifiers, Millimeter waves), Plasma physics, Gases, Pressure, Electrons, Magnetic fields, Stability, Density, Ionization, Cathodes, Xenon, Plasma oscillations.

The requirements of plasmas for use in millimeter- and submillimeter-wave beam-plasma amplifiers are discussed. The criteria are described for determining the gas type and pressure in terms of the mean-free-path of beam electrons. The restrictions placed on magnetic fields and stability problems are also discussed. Methods of generating high-density, highly-ionized plasmas are described and results are presented of some initial experiments. These experiments involve a two-hot-cathode PIG discharge whose plasma density is measured with a Langmuir probe. Preliminary measurements indicate that plasma densities over 5 times 10 to the 13th power per cubic centimeter are easily obtained. These densities were obtained with xenon gas at a pressure of 0.033 Torr. Critical magnetic fields were observed above which anomalous diffusion is obtained. Some of the conclusions reached are that magnetic fields should be kept below critical values, and that, in view of the present experimental results, the convenient attainment of much higher plasma densities is encouraging. Other conclusions are also made and recommendations for future work are presented. (Author)

AD-419 456 Div. 25
OTS price $9.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A CALORIMETRIC DEVICE FOR THE MEASUREMENT OF TOTAL HEMISPHERICAL EMITTANCE,
by Robert Ian McDowell. Aug 63, 89p. Rept. no. GA ME63 3
Unclassified report

Master's Thesis.

Descriptors: (*Thermal radiation, Measurement), (*Calorimeters, Emissivity), Filaments, Blackbody radiation, Temperature, Thermocouples, Calibration, Mechanical properties, Instrumentation, Design, Compressive properties, Heat transfer, Disks.

A small experimental apparatus was designed for the measurement of total hemispherical emittance of thin flat disc specimens over the temperature range of 0F to 300F. It is a steady-state device which employs thermal radiation from a hot wall for specimen heating. An equation is developed for the calculation of specimen emittance for which only temperatures need be measured between 40F and 100F, justifies an anticipated maximum error of ±3% for high emittance specimens. (Author)

AD-419 466 Div. 25
OTS price $9.10

California Inst. of Tech., Pasadena.
REFLECTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES AT ELECTRON DENSITY GRADIENTS,
by Frank A. Albini and Robert G. Jahn. Oct 60, 1v. TN3
Contract AF49 638 758
AFOSR 1506 Unclassified report

Descriptors: (*Electromagnetic wave reflection, Electron density), Transmissions, Electron density, Propagation, Functions, Gas ionization, Dielectrics, Oscillation, Microwaves, Shock waves, Plasma physics, Radar signals.

Solutions are obtained for the propagation of plane electromagnetic waves parallel to a gradient of free electron density, in the form of complex Airy functions. Reflection and transmission coefficients are derived for normal incidence on a linear 'ramp' of electron density connecting a uniform dielectric gas with a uniform ionized gas, as functions of ramp length and propagation exponent of the latter. Machine evaluations of typical cases of physical interest are displayed and discussed. Similar study is made of two-stage ramps of variable proportions, intended as second approximations to smooth profile transition zones. In each case, the reflection and transmission coefficients are found to depend strongly on ramp width over a range of several tenths of a wavelength, then to oscillate mildly toward the asymptotic values predicted from a WKB-type approximation. The results are less sensitive to the detailed shape of the electron density profile. Propagation through a finite slab of ionized gas bounded on each side by such linear transition zones is formulated and evaluated for typical cases. (Author)

AD-419 473 Div. 25, 15
OTS price $4.60

Harvard U., Div. of Engineering and Applied Physics, Cambridge, Mass.
UNSYMMETRICAL BUCKLING OF THIN SHALLOW SPHERICAL SHELLS,
by Nai-Chien Huang. Mar 63, 1v. Technical rept. no. 15
Contract Nonr1866 02
Unclassified report

Descriptors: (*Buckling (Mechanics), Structural shells), (*Numerical analysis, Buckling (Mechanics), (*Structural shells, Spheres), Thickness, Pressure, Deformation, Parabolic bodies, Stresses, Partial differential equations, Functions, Difference equations, Matrix calculus, Tables.

The theoretical study of buckling of clamped shallow spherical shells under uniform external pressure is treated. For sufficiently large deflection, deformations of such shells are not proportional to the applied pressure. The shell deforms axisymmetrically under sufficiently low pressure and if we assume that the deflection remains axisymmetrical, the pressure-deflection relation may be represented by a curve. (Author)

AD-419 480 Div. 25
OTS price $2.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
A STUDY OF UNDERWATER PROPAGATION FROM A HIGH-

POWER ELECTRICAL DISCHARGE.
Final technical rept.,
by M. J. Larsen, M. M. Newman and O. R. Gano.
June 63, 21p.
Contract Nonr58010, Proj. NR371 340
Unclassified report

Descriptors: (*Underwater sound, Propagation), (*Electric discharges, Underwater sound signals), Sea water, Hydrophones, Power, Electrodes, Electric currents, Wave transmission, Transients, Signals, Acoustics.

This report considers some acoustical observations resulting from a high-power electrical discharge. One of the main objectives in making acoustical tests was to obtain some kind of measure of the ratio of the radiated acoustical energy to that of the electrical energy of the discharge. For the tests made under sea water this ratio was observed to be on the order of 1 to 1000, while using a simple non-optimized discharge electrode design. Measurements made of air-to-water electrical discharges, as for example, a simulated lightning discharge to the surface, revealed substantially negligible underwater acoustical response. (Author)

AD-419 495 Div. 25
OTS price $7.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
STUDIES OF T-TUBE AND PARALLEL PLATE EXPLODING WIRE ACCELERATORS,
by Lloyd M. Schack and H. C. Wispell. Sep 63, 76p.
FRL TR3090 Unclassified report

Descriptors: (*Acceleration, Exploding wires), (*Plasma jets, Acceleration), (*Exploding wires, Particle accelerators), Ion bombardment, Temperature, Nuclear explosion, Simulation, Ions, Theory, Velocity, Density, Ion accelerators, Plasma physics.

During the developmend and fabrication of a coaxial accelerator two interim accelerators have been used: a T-tube accelerator and a parallel-plate accelerator. They were used to gain experience in diagnostics and apparatus operation. This apparatus, the techniques used, and some results of experiments performed are described in this report. (Author)

AD-419 519 Div. 25
OTS price $8.10

Falcon Research and Development Co., Denver, Colo.
EXPLOSIVE PARAMETERS FOR MAGNETOHYDRODYNAMIC ENERGY CONVERSION.
Final rept. 24 June 60-24 July 63,
by Marvin W. Burnham. Sep 63, 78p.
Contract AF08 635 2918, Proj. 2858
ASD TDR63 37 Unclassified report

Descriptors: (*Magnetohydrodynamics, Energy conversion), (*Explosive materials, Dynamics), Magnetic fields, Generators, Shaped charges, Geometry, Instrumentation, Measurement, Cavity liners, Plasma jets, Reliability, Ionization.

The explosive charge parameters related to the efficiency and utility of explosive energy sources for pulsed magnetohydrodynamic energy conversion were investigated. Experimental measurements were made of theoretically significant charge geometry and composition parameters. Good agreement with theory was observed and exceptionally high plasma conductivity was measured. A cavity shape, (called the W cavity) tending to produce a tubular conductor, was conceived and charges designed with such a cavity had a power generation capability of over 300% higher than that of charges with conventional cavities. (Author)

AD-419 532 Div. 25
OTS price $2.60

Narragansett Marine Lab., U. of Rhode Island, Kingston.
A MULTICHANNEL DIGITALIZED SYSTEM FOR THE AUTOMATIC RECORDING OF SHALLOW WATER AMBIENT NOISE DATA,
by Jack Willis, William B. Burch and Frank T. Dietz. Jan 63, 19p. Reference no. 63 6; Technical rept. no. 9
Contract Nonr 39604, Proj. NR385 205
Unclassified report

Report on Acoustic Project.

Descriptors: (*Noise, Digital recording systems), (*Underwater sound, Digital recording systems), Sampling, Electric filters, Transducers, Audiofrequency, Sensitivity, Dynamics, Pressure, Velocity, Amplifiers, Spectrum, Analyzers, Potentiometers, Circuits.

A system is described which permits the automatic sampling and digital recording of the filtered outputs from several transducers in the 1/3 octave bands from 16 to 100 cps. The signals are presented in digital form on a printed paper tape. Four transducers were used in this particular application, but the system described is flexible, so that additional transducers may be used. For transducers having different sensitivities or responding to different dynamic parameters (e.g., pressure or velocity) a correction is required to obtain absolute levels. (Author)

AD-419 533 Div. 25, 4, 17
OTS price $9.60

Oklahoma U., Research Inst., Norman.
THE EFFECT OF SOLID STATE DISLOCATIONS UPON THE CATALYTIC ACTIVITY OF METALS.
Final rept.,
by T. D. Perkins, C. M. Sliepcevich and W. H. Upthegrove. 1 Mar 63, 108p.
Contract Nonr98208, Task NR051 418
Unclassified report

Descriptors: (*Silver, Catalysts), (*Catalysts, Crystal lattice defects), (*Crystal lattice defects, Catalysts), Surface properties, Decomposition, Acids, Density, Deformation, Metals, Catalysis, Chromatographic analysis, Single crystals, Crystal growth, Test methods, Experimental data.

This report presents the results of an experimental investigation to determine the effect of dislocations upon catalytic activity. The dislocation density, superficial surface area, microscopic surface area, and mass of a silver catalyst were measured, and the (211) plane of the metal subsequently used to catalyze the decomposition of formic acid. Dislocation densities were varied by deforming plastically the metallic catalyst and ranged from 10 to the 6th power of 10 to the 8th power line intersections per square centimeter. Decomposition rates for the formic acid reaction were measured over a temperature range of 165 to 190 C and a pressure range of 20 to 70 millimeters of mercury. The effect of different dislocation densities upon catalytic activity was shown to be related to the change in hydrogen overpotential. (Author)

Division 25 - PHYSICS

AD-419 548 Div. 25
OTS price $5.60

University of Southern Calif., Los Angeles.
PHOTOIONIZATION AND PHOTOIONIZATION-INDUCED ION-MOLECULE REACTIONS.
Final rept.,
by G. L. Weissler. 1 Aug 63, 52p.
Contract AF19 604 6119, Projs. 7635 and 6688, Tasks 763505 and 66880
AFCRL 63 877 Unclassified report

Descriptors: (*Fluorescence, Gases), (*Luminescence, Gases), (*Gas ionization, Fluorescence), Ions, Molecules, Excitation, Electron transitions, Emissivity, Oxygen, Argon, Nitrogen, Carbon compounds, Carbon dioxide, Nitrogen compounds, Oxides, Monoxides, Photons, Pressure, Ultraviolet radiation, Atomic spectroscopy, Molecular spectroscopy.

The use of vacuum ultraviolet radiation as a diagnostic tool for obtaining information about molecular energy levels was demonstrated. Fluorescent radiation from the excited states of several gaseous ions was observed, and preliminary results are presented showing the intensity of the fluorescent radiation as a function of photon energy and gas pressure. Variations in the fluorescent decay time observed in certain gases, as a function of gas pressure, are also presented. (Author)

AD-419 554 Div. 25
OTS price $1.60

Spectrolab., Inc., Sylmar, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR LASER FREQUENCY.
Quarterly progress rept. no. 2, 10 May-9 Aug 63, by Samuel J. Holmes and Noel Bowman. 29 Aug 63, 12p.
Contract AF33 657 9216
Unclassified report

Descriptors: (*Lasers, Mica), (*Optical filters, Design), Frequency, Optical properties, Ruby, Refraction, Refractive index, Polarization, Light transmission, Dielectrics, Spectra (Visible and ultraviolet).

AD-419 558 Div. 25, 30
OTS price $7.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
EPITAXIAL GROWTH: AN ANNOTATED BIBLIOGRAPHY, comp. by Helen M. Abbott and James V. Kerrigan. Apr 63, 69p. Special bibliography SB63 32; Rept. no. 6 90 63 42
Unclassified report

Descriptors: (*Epitaxial growth, Bibliographies), (*Crystal growth, Bibliographies), Processing, Thin films (Storage devices), Single crystals, Thickness, Silicon, Arsenic, Antimony, Bismuth, Copper, Reaction kinetics, Films, Germanium, Vaporization, Diffusion, Quality control, Diamonds.

This compilation contains 169 selected references and a preface on epitaxial crystal growth. Included are such factors as crystal growth and formation, vapor growth, twinning, and thin film processes. (Author)

AD-419 577 Div. 25, 26
OTS price $.50

Naval Research Lab., Washington, D. C.
SIMULTANEOUS CONTAMINATION AND CONVERSION EFFECTS IN GERMANIUM HEATED TO TEMPERATURES IN THE EVAPORATION RANGE.
Final rept.,
by J. E. Davey and M. D. Montgomery. 26 July 63, 7p.
Proj. RR008 03 46 5658
NRL 5965 Unclassified report

Descriptors: (*Germanium, Films), (*Semiconducting films, Germanium), (*Vapor plating, Germanium), Contamination, Impurities, Phase studies, Containers, Zone melting, Graphite, High temperature research, Electrical properties.

Studies of germanium source material used for the vacuum evaporation of thin germanium films have been carried out by measuring the changes in the electrical properties of sources heated in the temperature range from 1100 to 1600 C. Using standard evaporation techniques and standard boat materials, the source germanium converts strongly to p-type, regardless of initial conductivity or type, and the properties of the resulting films are insensitive to the properties of the source. In a study of the causes of this source conversion, a number of experiments were performed which involved simple evaporation and combined zone-refining and evaporation processes in quartz and graphite boats in vacuum and helium ambients. The results indicate that the prevention of source conversion in vacuum may be attained by utilization of the zone-refining process in graphite, in situ, prior to treatment of the germanium as an evaporant. In addition, the results found using this technique confirm the hypothesis of Allen, Buck, and Law (J. Appl. Phys. 31:979 (1960) on the effect of Ge contamination by boron in borosilicate glass vacuum systems. (Author)

AD-419 579 Div. 25
OTS price $1.10

Rutgers U., New Brunswick, N. J.
MEASUREMENTS OF RELAXATION TIMES IN A COPPER TUTTON SALT AT LIQUID-HELIUM TEMPERATURES,
by K. L. Schick. July 62, 10p.
Contract Nonr40408
Unclassified report

Descriptors: (*Copper compounds, Relaxation time), (*Zinc compounds, Relaxation time), (*Potassium compounds, Relaxation time), Sulfates, Spin, Crystal lattices, Magnetic fields, Paramagnetic resonance, Liquefied gases, Helium, Paramagnetic materials.

Measurements were made of the relaxation time for various concentrations of Cu in $CuK_2(SO_4)_2 6H_2O$ diluted with $Zn K_2(SO_4)_2 6H_2O$ using the data to fit this expression. The dependence of relaxation parameter on the temperature, the concentration of Cu ions, and the sample size was obtained using a steady-state microwave saturation technique with DC detection. (Author)

AD-419 605 Div. 25
OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
STUDY OF FREE CONVECTIVE HEAT TRANSFER AT EXTREMELY HIGH PRANDTL NUMBERS FROM HORIZONTAL HEATED CYLINDERS,
by Jerry N. Mason. Aug 63, 74p.
AFIT GAE ME63 7 Unclassified report

Master's thesis.

Descriptors: (*Viscosity, Heat transfer), (*Fluids, Vscosity), Tansients, Cylindrical bodies, Polymers, Convection, Boundary layer, Heat transfer, Coefficients, Equation.

This study dealt with transient heat transfer from heated horizontal cylinders to a hydrocarbon polymer of high viscosity. It had been predicted analytically that during transient free convection the thermal boundary layer would grow in size during the conduction phase of the flow and then shrink to some steady state value as fluid motion began. It had also been predicted that the film heat transfer coefficient would reach a minium and then increase to some steady state value. A series of seven tests on one-fourth inch diameter cylinders and six tests on wires of thirty-two hundreths inches in diameter showed experimentally that the predictions occurred. The similiarity laws were shown to be applicable to steady state free convection from horizontal cylinders to the high viscosity fluid. From the plot of log Nusselt number vs log Prandtl x Grashof numbers an equation was obtained. (Author)

AD-419 612 Div. 25, 4
OTS price $4.60

Frick Chemical Lab., Princeton U., N. J.
VIBRATION - ROTATION SPECTRA OF CH_4 AND CD_4 IMPURITIES IN XENON, KRYPTON AND ARGON CRYSTALS,
by A. Cabana, D. F. Hornig and G. B. Savitsky.
June 63, 1v. Technical rept. no. 15
Contract Nonr1858 27, Proj. NR014 203
Unclassified report

Descriptors: (*Xenon, Crystals), (*Krypton, Crystals), (*Argon, Crystals), (*Organic compounds, Spectra (Infrared)), (*Spectra (Infrared), Alkenes), Molecular rotation, Vibration, Absorption spectrum, Crystal lattice defects, Cryogenics, Deuterated compounds.

The infrared spectra of CH_4 and CD_4, present as substitutional impurities in crystals of Ar, Kr and Xe, were studied at temperatures ranging from 5 to 40 K. Both nu sub 3 and nu sub 4 of CH_4 in Xe showed a simple four line pattern which is consistent with that expected for a slightly hindered rotor. In Kr and Ar a fifth line appeared on nu sub 3 and expected from King's theoretical calculations for a tetrahedral rotor in an octahedral field. In addition, Ar showed absorption due to pairs or higher aggregates of CH_4 molecules. The rotational spectrum of CD_4 is much more highly perturbed. Detailed assignments to hindered rotational levels could not be made but the general features are in accord with King's model. The frequencies of the CH_4 and CD_4 absorption bands increase steadily in going from Xe to Kr to Ar. This can be accounted for by the decrease in the sizes of the cavities occupied, with corresponding larger repulsive interactions between the CH_4 or CD_4 and the host atoms. (Author)

AD-419 614 Div. 25
OTS price $7.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DIAGNOSIS OF PLASMA CYLINDERS BY ANGULAR SCATTERING OF MICROWAVES,
by Ronald L. Easley. 1 May 63, 73p.
AMC Rept. no. RR TR63 14
Unclassified report

Descriptors: (*Plasma jets, Measurement), (*Microwaves, Scattering), Electromagnetic waves, Interferometers, Electron density, Diffraction, Propagation, Calibration, Cylindrical bodies, Fourier analysis, Bessel functions, Radiometers, Recombination reactions, Gases, Argon, Generators.

The determination of the electron density and collision frequency of a plasma cylinder through the measurement of the angular distribution of free-space electromagnetic waves scattered by the cylinder was investigated experimentally. A 20 kilowatt, dc arc, argon plasma jet formed a cylindrical plasma requiring no containing walls. Angular scattering distributions were measured at 35 and 72 kmc. A 72 kmc microwave interferometer provided an independent measurement of the plasma properties. Predicted values for the magnitude and phase of the scattered field were obtained, using an IBM 7090 computer to solve the scattering problem for a homogeneous, infinitely long plasma cylinder having a range of electron densities and collision frequencies. The plasma jet was found to have a rapidly decreasing electron density as a function of radius. The value of angular scattering measurements in determining the properties of such inhomogeneous pla cylinders is shown. (Author)

AD-419 632 Div. 25
OTS price $1.10

California U., Los Angeles.
MAGNETIC EFFECTS IN SOLIDS.
Quarterly status rept. no. 10, 1 Sep 61-1 Dec 62,
by David I. Paul. Dec 62, 3p.
Contract Nonr23363, Proj. NR018 105
Unclassified report

Descriptors: (*Magnetism, Scientific research), (*Antiferromagnetism, Scientific research), (*Nuclear magnetic resonance, Scientific research), Spin, Electrons, Electromagnetic waves, Reports.

AD-419 633 Div. 25
OTS price $1.60

California U., Berkeley.
AZBEL-KANER RESONANCE IN TIN WITH MAGNETIC FIELD PERPENDICULAR TO THE SURFACE,
by J. F. Koch and A. F. Kip. 1962, 12p.
Unclassified report

Descriptors: (*Cyclotron resonance phenomena, Tin), Anisotropy, Magnetic fields, Surfaces, Single crystals, Symmetry (Crystallography), Oscillation, Polarization.

AD-419 634 Div. 25
OTS price $2.60

California U., Berkeley.
FAR INFRARED ANTIFERROMAGNETIC RESONANCE IN MnO AND NiO,
by A. J. Sievers, III and M. Tinkham. 1963, 25p.
Unclassified report

Descriptors: (*Antiferromagnetism, Resonance), (*Manganese compounds, Oxides), Frequency, Temperature, Polarization, Nickel compounds, Neutron diffraction analysis, Anisotropy, Infrared optical systems, Crystal structure, Resonance absorption, Magnetic properties, Brillouin zones, Single crystals, Symmetry (Crystallography), Infrared phenomena, Crystal lattices.

The uniaxial dipolar anisotropy in antiferromagnetic MnO and NiO aligns the two opposing sublattice moments in an easy (111) plane. The two normal modes for small oscillations of the sublattice magnetizations about a preferred direction within this plane are both nondegenerate and linearly polarized. The high frequency mode has been observed at low temperatures (2 K) at 27.5 and 36.6 cm in MnO and NiO, respectively. In agreement with the unobservably small second-order Zeeman shift expected for these nondegenerate modes, a 10.7 koe field was found to have no effect on the observed resonance frequencies. Increasing the sample temperature decreases the frequency of the mode in each case. (Author)

AD-419 637 Div. 25
OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
(No title).
Status rept. no. 19,
by S. A. Friedberg. 30 Sep 62, 7p.
Contract Nonr76005, Proj. NR018 301
Unclassified report

Descriptors: (*Magnetic materials, Scientific research), (*Antiferromagnetism, Scientific research), (*Magnetism, Scientific research), Magnetic properties, Single crystals, Cryogenics, Manganese compounds, Bromides, Hydrates, Metalorganic compounds, Iron compounds, Copper compounds, Nitrates, Chlorides, Fluorides, Powders, Garnet, Yttrium compounds, Thermal conductivity, Hydrogen, Solidified gases, Solid state physics, Specific heat, Molecular rotation.

Contents:
Calorimetry above 1 degree K
Magnetic susceptibilities
Thermal conductivity
Solid hydrogen

AD-419 638 Div. 25
OTS price $1.10

California U., Berkeley.
ELECTRONIC CHARGE CARRIER BEHAVIOR.
Quarterly status rept. Mar-June 62,
by Arthur F. Kip. June 62, 2p.
Contract Nonr22259, Proj. NR018 409
Unclassified report

Descriptors: (*Cyclotron resonance phenomena, Analysis), Microwave frequency, Tin, Aluminum, Potassium, Sodium, Magnetic fields, Polarization.

AD-419 648 Div. 25
OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
FRICTION IN THE BEARINGS AND GEAR TRAIN OF A FLYWHEEL ACCELERATION INTEGRATOR,
by David L. Blanchard. Oct 63, 19p.
NOL TR63 127 Unclassified report

Descriptors: (*Bearings, Friction), (*Friction, Gears), Flywheels, Acceleration, Motion, Equations, Ball bearings, Models, Torque, Loading, Design, Tests.

The objective of this study is to develop an equation of motion which accurately describes the motion of the flywheel of a mass-flywheel acceleration integrator. The initial problem is to write an accurate equation of motion for a coasting flywheel supported with radial ball bearings. Viscous and Coulomb frictional terms are included in this equation of motion. Experimental evaluation of these frictional terms reveals discrepancies in this mathematical model of ball bearing friction. Consequently, a single frictional term is included in the equation of motion. The results are very consistent and the equations are much more straightforward. The torque loss, due to friction in radial ball bearings, is a function of the radial load raised to the 2.34 power and the coefficient of friction is a function of radial load. From the results of the coasting flywheel analysis, an equation of motion is developed to describe the motion of the flywheel when coupled with an acceleration sensing mass by a precision gear train. Agreement between predicted and observed flywheel motion is good for both the accelerated and coasting system. (Author)

AD-419 649 Div. 25
OTS price $3.60

Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURE TO INVESTIGATE PROPERTIES OF INDIUM ANTIMONIDE AND TO PROVIDE 801-C6 INFRARED DETECTORS.
Quarterly progress rept. no. 2, 27 Mar-27 June 63,
by Robert L. Smythe and William L. Kolander.
June 63, 27p. Rept. no. 04 63 5
Contract DA36 039AMC01463E, PEM Proj. S4089
Unclassified report

Descriptors: (*Indium alloys, Photoconductivity), (*Antimony alloys, Photoconductivity), (*Infrared detectors, Production), Purification, Zone melting, Crystal growth, Impurities, Copper, Diffusion, Hall effect, Resistance (Electrical), Germanium.

The responsivity of indium antimonide doped with germanium has been increased. Material preparation is of prime importance, as is the handling of this material after preparation to avoid stresses and resulting dislocations and fractures. Accurate Hall data on high resistivity p-type material was difficult to acquire. Different techniques have been used to gain better correlation. Measured device resistances do not agree with calculated resistances, and improved prediction methods are being studied. Electrolytic etching of wafers increases response, lowers noise and decreases carrier recombination at the surface. (Author)

AD-419 657 Div. 25
OTS price $10.10

Purdue U. School of Aeronautical and Engineering Sciences, Lafayette, Ind.
ON THE STATIC NONLINEAR THEORY OF ELECTROMAGNETIC THERMOELASTIC SOLIDS,
by Neal F. Jordan and A. Cemal Eringen. July 63, 120p. Technical rept. no. 21
Contract Nonr110023
Unclassified report

Doctoral thesis.

Descriptors: (*Elasticity, Solids), (*Deformation, Solids), (*Thermal stresses, Solids), (*Electromagnetic fields, Solids), Aerodynamic heating, Cylindrical bodies, Dielectrics, Stresses, Electric fields, Magnetic fields, Polynomials, Mathematical analysis, Theory.

Basic field equations, boundary conditions, and

constitutive equations, necessary for the treatment of problems concerning the nonlinear, steady state behavior of elastic solids subject to large deformations, electromagnetic fields and thermal gradients, are derived and employed to solve 3 specific problems. The problems solved are: Simple shear of an infinite dielectric slab the faces of which are maintained at different temperatures and potentials, Torsion of an incompressible, circular, conducting cylinder with axial electric field, and Response of a rigid, annular, dielectric cylinder to an axial magnetic field and radial electric field. (Author)

AD-419 660 Div. 25
OTS price $1.10

Texas A. and M. Coll., College Station.
(No title).
11 Feb 63, 2p.
Grant 62 151
AFOSR 5210 Unclassified report

Descriptors: (*Diffusion, Liquids), (*Mixtures, Diffusion), (*Organic compounds, Diffusion), (*Molecular rotation, Solutions), Cycloalkanes, Organic solvent, Halogenated hydrocarbons, Titanium compounds, Silicon compounds, Chlorides, Relaxation time, Benzene, Organic sulfur compounds.

AD-419 674 Div. 25
OTS price $2.60

Pennsylvania State U., University Park.
A VERSATILE FIELD ION MICROSCOPE,
by S. B. McLane, Jr. and E. W. Muller. Dec 62, 26p.
Contract Nonr65623, Proj. NR017 443
Unclassified report

Descriptors: (*Microscopes, Ions), Hydrogen, Cooling, Electric potential, Materials, Solidified gases, Nitrogen, Grain structures, Glass, Helium, Ionization.

An all metal design of the field ion microscope has proven to be both feasible and versatile. Adaptibility, variable magnification, ruggedness, greater safety when used with liquid hydrogen cooling, and high voltage shielding characterize this model. A 6 inch diameter vertical screen, which is easily replaceable, facilitates its use. Application of this model to the study of different screen materials, the use of solid nitrogen cooling, and the study of grain boundaries is described. (Author)

AD-419 685 Div. 25
OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH. 1963 NO. 2.
16 Aug 63, 50p.
Contract AF19 628 500
Unclassified report

Descriptors: (*Solid state physics, Scientific research), (*Masers, Design), (*Diodes (Semiconductor), Materials), Crystal growth, Spectroscopy, Indium alloys, Gallium alloys, Arsenic alloys, Lead alloys, Selenium alloys, Epitaxial growth, Single crystals, Bismuth, Titanates, Films, Superconductivity, Niobium, High pressure research, Chemical analysis, Raman spectroscopy, Attenuation, Transition elements, Rare earth compounds, Optics, Electroluminescence, Infrared spectroscopy, Cryogenics, Antiferromagnetism, Lasers.

AD-419 687 Div. 25, 4
OTS price $4.60

Cornell U., Ithaca, N. Y.
INTERFERENCE MICROSCOPY OF HIGH POLYMERS,
by Peter Sullivan and Bernhard Wunderlich.
30 May 63, 42p. TR4
Contract Nonr40144, Proj. NR051 428
Unclassified report

Descriptors: (*Microscopy, Interference analyzers), (*Polyethylene plastics, Microscopy), Crystal growth, Solutions, Thickness, Measurements, Single crystals, Interferometers, Test equipment, Test method, Light, Polarization, Equations, Polymers.

The research conducted under the Contract Nonr 401 (44) is entitled: ''Polymers at High Pressure''. Interference Microscopy has been developed in this connection as a service tool to analyze the morphology of polymer samples crystallized at elevated pressure. The results obtained were so satisfactory, however, that it was also undertaken to use this tool for studies of morphology of atmospheric pressure crystallized polymers and an investigation of the thermodynamics of melting of polymer single crystal lamellae. In this thesis, the different kinds of interference microscopy as applied to polymer research in this laboratory are described. The principal polymer used is a linear polyethylene. (Author)

26. PRODUCTION AND MANAGEMENT

AD-419 010 Div. 26, 30
OTS price $1.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Final rept.,
by Olof Gustafsson. 13 Aug 62, 18p. Rept. no. AL62L015
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Instrumentation, Vibration), (*Bearings, Vibration), (*Vibration, Measurement), Electronic equipment, Calibration, Test equipment.

The electronic unit and the pickup as well as the mechanical unit were studied and work was done to develop calibration and correlation techniques applicable to each of these units. In order to develop a reliable calibration method for any mechanical or electrical unit, the unit must meet certain requirements. If the equipment operates in an unpredictable, erratic manner or if the response of some of its components highly deviates from its intended characteristics (for instance if it introduces non-linear effects) then a reliable calibration may not be possible. This fact was considered in developing the calibration techniques, and in some instances where a component did not permit reliable calibration, recomendations were made and specifications written for a modification of this component which would meet the requirements of accurate calibration. (Author)

AD-419 035 Div. 26, 14, 8
OTS price $3.60

Army Frankford Arsenal, Philadelphia, Pa.
THE EFFECTS OF DIP SOLDERING UPON VARIOUS BOARD MATERIALS AND SOLDER RESIST USED IN PRINTED CIRCUITS,
by Robert P. Hogan and Bernard Stepanski.
Aug 63, 36p.
FA PP T9672 2 Unclassified report

Descriptors: (*Soldering, Printed circuits), (*Printed circuits, Materials), Processing, Tests, Paper, Glass textiles, Phenolic plastics, Epoxy plastics, Silicone plastics, Nylon, Textiles, Soldering fluxes, Tables, Data, Fire-resistant textiles.

This report describes the procedures in conducting eleven dip soldering tests to determine the effects that dip soldering at various temperatures and times has upon various printed circuit board materials, and solder resist materials. It discusses the results and conclusions of these soldering tests. (Author)

AD-419 038 Div. 26, 11
OTS price $2.60

Hiller Aircraft Corp., Palo Alto, Calif.
GEM JACK CONEX MOVER: COST, RELIABILITY, OPERATION, AND MAINTENANCE CONSIDERATIONS.
Oct 63, 24p.
Contract DA44 177TC752, Task 1D021701A04815
ATRECOM Technical rept. 63 53
Unclassified report

Descriptors: (*Ground effect machines, Jacks (Mechanics)), (*Jacks (Mechanics), Ground effect machines), (*Positioning devices (Machinery), Ground effect machines), Containers, Operation, Performance (Engineering), Stability, Noise, Blowers, Compressors.

The usefulness of the air-bearing principle in moving heavy loads over relatively smooth surfaces has been demonstrated. The ability of a flexible seal to permit movement over significant obstacles, such as a 4-inch lower-hold brow, with adequate stability and acceptable efficiency was investigated. Two experimental 5-ton CONEX container jacks were constructed to permit seal evaluation under operational conditions. Since the air requirements fell in a pressure/volume range for which few sources were available, the expedient of employing a roots-type blower to satisfy the requirements introduced inordinate noise problems which are now the subject of investigation before operational tests are conducted. The attached report describes the operation, maintenance, and construction details of the device, including some cost information for producing a device of this sort. (Author)

AD-419 059 Div. 26, 27
OTS price $8.60

North American Aviation, Inc., Los Angeles, Calif.
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS. PHASE I. MATERIAL SELECTION, PROCESS DEVELOPMENT, AND PRELIMINARY DESIGN,
by M. H. Weisman, G. Martin, W. D. Padian, S. Salmassy and T. Fan. Nov 62, 90p.
Contract AF04 611 8177, Proj. 6753, Task 675304
RTD TDR63 1027 Unclassified report

Descriptors: (*Brazing, Rocket components), (*Welding, Rocket components), (*Rocket components, Welding), (*Pipe fittings, Thermal joining), Aluminum, Pipes, Test methods, Rocket propulsion, Materials, Rocket propellants, Shear stresses, Designs, Welds, Machining, Controlled atmospheres, Stainless steel, Pressure, Fatigue (Mechanics), Vibration, Thermal stresses, Shock (Mechanics), Test equipment, Environmental tests, Corrosion, Data, Experimental data, Fluids, Nickel alloys, Chromium alloys, Cobalt alloys.

Recommendations are presented for lightweight brazed and welded fittings for use with rocket propulsion fluid systems. Joining procedures and preliminary designs have been developed for induction brazed and TIG welded fittings for tubing of AISI 347 stainless steel, AM 350 precipitation hardening stainless steel, and Rene' 41 alloy. Studies have also been conducted on the feasibility of brazed and welded fittings for use with aluminum tubing. Procedures have been prepared and the required facilities are being installed for qualification testing of the fittings and joining processes during the Phase II part of this program. The fittings will be tested to rigid requirements under the Qualification Tests and other future efforts of this program and the results will be documented. (Author)

AD-419 079 Div. 26, 17
OTS price $5.60

Central Inst. for Industrial Research (Norway).
DEVELOPMENT OF EXPLOSIVE TECHNIQUES IN METAL FORMING.
Status Report No. 2, 1 Jan-30 Jun 63,
by B. Hagland, T. Lindtveit, B. Eftestol, J. Gjonnes and K. Schreiner. 31 Jul 63, 31p.
Contract N15MWP N62
Unclassified report

Descriptors: (*Explosive forming, Manufacturing methods), Welding, Powder metallurgy, Stainless steel, Austentite, Plasticity, Aluminum, Sheets.

The present research project comprises studies of explosive techniques for sheet metal forming, welding and compaction of powder. The more basic problems in these processes have been emphasized, but also are being studied. During the first year of the project, extensive preparations with respect to facilities, tooling, etc. have taken place, but also systematic experimentation has reached a satisfactory stage of development. Preliminary studies of dynamic plasticity indicate that detailed information about instantaneous plastic deformation, shape of the cup, normal velocity of blank and horizontal velocity of bending wave can be obtained by means of the experimental technique chosen. The effect of shock intensity and high strain rates on structural changes in austenitic stainless steel (SAE 304) have been shown to be appreciable. Improved x-ray techniques for identification of mechanical twins and other structural defects are being developed. Explosive welding of all combinations between stainless steel and aluminum have been studied. The occurence of brittle instrumentallic layers, local melting, recrystallization and ripple formation have been demonstrated. (Author)

AD-419 235 Div. 26, 9
OTS price $7.60

Dayton U., Research Inst., Ohio.
INVESTIGATIONS OF BALLISTIC-PISTON AND LIQUID DRIVEN PISTON COMPRESSORS FOR THE PRODUCTION OF HIGH TEMPERATURE AND HIGH DENSITY GASES.
Rept. for 15 June 62-14 June 63,
by John E. Minardi and Robert B. Schwartz.
Aug 63, 64p.
Contract AF33 657 8975, Proj. 7116, Task 7116 01
ARL 63 167 Unclassified report

Report on Internal Flow Research.

Descriptors: (*Compressors, High temperature research), Pistons, Gases, Theory, Fluid flow, Friction, Pressure, Temperature, Test equipment, Stability.

The analysis adopted to determine the parameters affecting the maximum performance of the ballistic-piston compression process is divided into two cases. A heavy piston treatment, which considers the charge gas compression to be polytropic, is presented for compressions in which the irreversibilities induced into the charge gas by pressure waves may be considered negligible. If the entropy increases associated with these waves are not negligible as light piston analysis is required. The experimental results of the liquid driven piston system, in which the charge gas is rapidly compressed as it decelerates a high speed column of water, have demonstrated that pressures in excess of water hammer can be achieved. Hence, it is seen that the piston, in addition to providing a means of separating the liquid driver and charge gas, enables higher pressures to be achieved than the impact pressure in the driver fluid. (Author)

AD-419 574 Div. 26
OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
RELIABILITY REQUIREMENTS FOR REPROCUREMENT,
by John Oliver Spencer. Aug 63, 61p.
AFIT GRE ME63 5 Unclassified report

Master's thesis.

Descriptors: (*Reliability, Armed Forces supplies), (*Armed Forces procurement, Reliability), (*Procurement, Reliability), Management engineering, Manufacturing methods, Quality control, Economics, Tests, Military requirements.

The purpose of this thesis is to report on the results of a study to determine: (1) the benefits of using reliability in the procurement of replenishment spares, (2) uses of reliability information to determine the necessity for special engineering efforts in reprocurement actions, and (3) some guides for use in obtaining the necessary reliability in replenishment spares. (Author)

AD-419 596 Div. 26, 15
OTS price $13.50

Applied Mathematics and Statistics Labs., Stanford U., Calif.
SOME ECONOMIC ASPECTS OF RELIABILITY AND PROJECT MANAGEMENT,
by David C. Dellinger. 31 May 63, 194p. Technical rept. no. 67
Contract Nonr22553, Proj. NR042 002
Unclassified report

Descriptors: (*Management engineering, Mathematical models), (*Statistical analysis, Reliability), (*Statistical tests, Effectiveness).

AD-419 610 Div. 26, 30
OTS price $5.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
MANAGERIAL ASPECTS OF A GENERALIZED AIR FORCE RELIABILITY PROGRAM,
by Donald Arthur Riess. Aug 63, 45p.
AFIT GRE ME63 4 Unclassified report

Master's thesis.

Descriptors: (*Management engineering, Effectiveness), (*Reliability, Management engineering), Air force research, Job analysis, Logistics, Air Force Systems Command.

The purpose of this report is to analyze the present Air Force reliability program and to recommend those managerial philosophies and organizational principles that will insure the fulfillment of the Air Force reliability program objectives. The central theme of the report is to emphasize that the responsibility for reliability rests solely with management and that it is the attitude of management that will determine the extent and effectiveness of any reliability program. (Author)

27. PROPULSION SYSTEMS

AD-419 522 Div. 27
OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
DETERMINATION OF TEMPERATURE HISTORY OF A SOLID-PROPELLANT ROCKET-MOTOR NOZZLE.
Topical rept., Mar 62-Apr 63,
by I. M. Grinberg and E. W. Ungar. 31 May 63, 30p.
Contract AF33 657 8212, Task 73500
Unclassified report

Supplement to ASD-TIR-63-738, AD-419 489.

Descriptors: (*Rocket motors (Solid propellant), Rocket motor nozzles), (*Rocket motor nozzles, Temperature), Mathematical models, Aluminum compounds, Oxides, Heat transfer, Combustion products, Nozzle gas flow, Particles, Turbulence, Chemical equilibrium, Thermal conductivity, Test equipment, Rocket igniters, Surface temperatures, Molybdenum, Materials.

A mathematical model was developed by which the temperature history of a solid-propellant rocket-motor nozzle was successfully predicted. The model accounts for the effect of alumina deposition on nozzle throat area and heat transfer, the igniter contribution to the combustion products, and the effect of changing burning area on mass flow. It was found that a relatively simple model successfully predicts the alumina layer history. This model is based on turbulent diffusion of particles to the nozzle surface, thermal equilibrium between the deposited alumina layer and the wall, and a vanishingly thin molten oxide layer. In addition, a parametric study was conducted which shows the thermal response of nozzle materials with variable thermal properties. (Author)

AD-419 543 Div. 27
OTS price $8.10

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF NOZZLE CONFIGURATIONS FOR A RADIATION COOLED HELIUM ARC JET,
by Alan T. Yamagiwa. Aug 63, 76p.
AFIT GAE/ME/63 13 Unclassified report

Master's thesis.

Descriptors: (*Arc jet engines, Rocket motor nozzles), Electric propulsion, Configuration, Thermal radiation, Cooling, Helium, Performance (Engineering), Conical nozzles, Design, Specific impulse, Reaction kinetics, Effectiveness, Electric arcs, Electric potential, Erosion, Thrust, Pressure.

Experiments were conducted to compare the performance characteristics of three arc jet nozzle configurations with respect to one another. The nozzles tested in this experiment were the conical, horn and contour. The test results clearly show that the overall performance of the conical is better than the other designs. Although no optimum performance was sought or was achieved, the conical nozzle was found to have a higher I-sub sp/power input, greater kinetic efficiency, lower weight and better stability in the ranges of power and mass flow tested. (Author)

AD-419 544 Div. 27, 10, 9
OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL INVESTIGATION OF NOZZLE COOLING FOR A SMALL ROCKET ENGINE,
by Donald J. Alser. Aug 63, 119p.
AFIT GAE/ME/63 1 Unclassified report

Master's thesis.

Descriptors: (*Rocket motor nozzles, Film cooling), Chemical reaction, Gases, Hydrogen, Bipropellants, Coolants, Regenerative cooling, Sweat cooling, Ablation, Design, Fuel injectors, Combustion chamber liners, Conical nozzles, Hydrogen, Fuel systems, Instrumentation, Test methods, Effectiveness, Rocket motors (Liquid propellant), Performance (Engineering), Configuration, Velocity, Exhaust gases, Nozzle gas flow, Oxygen.

An investigation was made to determine experimentally the effect of film-cooling a rocket engine nozzle with a reactant gas. Coolant quantities, injection velocities and angles, and axial injection location were varied to determine the conditions under which adequate film cooling could be achieved. Five basic coolant configurations consisting of three De Laval type nozzles and three coolant chamber liners provided coolant injection at the nozzle entrance and/or near the nozzle throat. Decreasing the injection velocity resulted in increased wall temperature reductions so that critical areas of the nozzle could be adequately film cooled. (Author)

AD-419 552 Div. 27, 17
OTS price $8.10

TAPCO Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
FEASIBILITY DEMONSTRATION OF A TRANSPIRATION COOLED NOZZLE SYSTEM.
Interim rept. no. 1, 15 June-14 Sep 63.
Sep 63, 82p. Rept. no. ER5209 11
Contract AF04 611 9071, Proj. 3059, Task 305907 and 305913
RTD Rept. no. TDR63 1036 Unclassified report

Descriptors: (*Rocket motor nozzles, Sweat cooling), Feasibility studies, Manufacturing methods, Captive tests, Materials, Tensile properties, Powder alloys, Powder metallurgy, Sintering, Permeability, Gas flow, Porous metals, Tungsten, Mechanical properties, Thermal stresses, Temperature, Physical properties, Graphite, Electron beams, Welding, Tantalum, Heat transfer, Nitrogen, Cooling, Differential equations, Programming (Computers), Coolants.

Presented are the first phase theoretical analyses and bench tests leading to fabrication and test of a nozzle system employing transpiration cooling in the throat region. Processing technology studies are made for porosity control and stability of sintered tungsten to be utilized as the throat insert porous media. Joining investigations were made to determine the compatibility of porous tungsten to tantalum welds by both tungsten-inert-gas and electron beam equipment and brazing studies initiated. Heat transfer relations for transpiration cooling were developed and programmed for IBM 7070 solution. Thermal stress relations incorporating yielding of the inner surface were developed and sample calculations made. A study of various coolants was made for specific application to transpiration cooling. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-419 093 Div. 28, 32
OTS price $2.60

Institute for Social Research U. of Michigan, Ann Arbor.
COGNITIVE CONSEQUENCES OF A PERSON'S POSITION IN A FORMAL ORGANIZATION,
by Robert B. Zajonc and Donald M. Wolfe. June 63, 26p. Technical rept. no. 24
Contract Nonr122434, Proj. NR170 309
Unclassified report

Descriptors: (*Personnel, Social communication), (*Professional personnel, Social communication), (*Industrial psychology, Group dynamics), (*Employee relations, Analysis).

The purpose of this study is to examine these cognitive consequences of a person's position in a communication network which derives from his position in a formal organization. A sample of employees of an industrial company employing approximately 1000 men was examined for their participation in the communication process and for the cognitive consequences of their positions in the company. The main concern was with the way the employees view the company itself. Cognitions about the company were examined among employees responsible for line as well as for staff functions. Within each function the sample included three hierarchical levels. (Author)

AD-419 122 Div. 28, 23
OTS price $.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
A CLASSIFICATION OF LEARNING TASKS IN CONVENTIONAL LANGUAGE,
by Elmo E. Miller. July 63, 20p.
Contract AF33 616 5965, Proj. 7183, Task 718306
AMRL TDR63 74 Unclassified report

Descriptors: (*Learning, Training), (*Training, Learning), Classification, Standards, Theory.

Classifying learning tasks may aid in analyzing training requirements and applying learning principles. To this end the term ''learning task'' is defined for purposes of the classification, and a descriptive system is introduced for analyzing training requirements and for relating various practice conditions. A logically exhaustive classification is presented. Learning tasks are categorized by applying the definitional criteria sequentially. Major categories are ''perceptual-motor,'' ''discovery,'' ''understanding,'' ''perceptual judgment,'' and ''memorizing,'' corresponding roughly with common usage of the terms. The criteria for class membership are of three kinds: (a) discrepancies between criterion performance and initial skills of trainees, (b) restrictions on practice conditions considered legitimate in meeting the particular performance test, and (c) the kind of overt behavior constituting criterion performance and the allowable alternatives in such performance. The restricted applicability of generalizations about learning to certain categories is discussed. (Author)

AD-419 164 Div. 28
OTS price $1.60

Pittsburgh U., Pa.
BEHAVIOR IN GROUPS. TEST OF A PROPOSED THEORY OF LEADERSHIP.
Annual rept. no. 8,
by Bernard M. Bass. 15 Nov 62, 11p.
Contract N7onr35609
Unclassified report

Descriptors: (*Leadership, Theory), (*Behavior, Group dynamics), Test construction (Psychology), Attitudes, Social communication.

AD-419 174 Div. 28
OTS price $2.60

American Psychological Association Inc., Washington, D. C.
APPROACHES TO THE TAXONOMY OF SOCIAL SITUATIONS TASK OR SITUATION,
by S. B. Sells. 30 Aug 63, 17p.
Technical rept. no. 4
Contract NONR343600
Unclassified report

Descriptors: (*Behavior, Ecology), Adjustment (Psychology), Adaptation (Physiology), Sociology.

This presentation is divided into two parts, theoretical and empirical. The theoretical section will attempt to justify a programmatic proposal for multivariate studies of species' behavior repertories and environmental habitats as a necessary step toward a systematic formulation of behavior theory in phylogenetic perspective. The implications of this position are believed to be far reaching. They apply to the immediate problems of social psychology, but are also relevant to the science of psycholgy in its broadest frame of reference. The empirical section will present the results of some current research carried out with the support of the Group Psychology Branch of the Office of Naval Research. These data are more directly related to my assigned topic. (Author)

AD-419 175 Div. 28
OTS price $2.60

Texas Christian U., Fort Worth.
AN INTERACTIONIST LOOKS AT THE ENVIRONMENT,
by S. B. Sells. 5 Apr 63, 23p. Technical rept. no. 3
Unclassified report

Descriptors: (*Adjustment (Psychology), Ecology), (*Adaptation (Physiology), Ecology), (*Behavior, Determination).

AD-419 176 Div. 28
OTS price $1.60

Texas Christian U., Fort Worth.
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
Annual progress rept.
by S. B. Sells. 1 Oct 63, 9p.
Contract Nonr3436 00
Unclassified report

Descriptors: (*Behavior, Sociometrics), Factor analysis, Measurement.

AD-419 206 Div. 28
OTS price $3.60

Bell Helicopter Co., Fort Worth, Tex.
THE EFFECT OF VARIATIONS IN CONTROL SYSTEM DYNAMICS UPON TRACKING PERFORMANCE,
by W. E. Feddersen. 30 Oct 58, 28p. Rept. no. D228 430 001
Contract Nonr1670 00
Unclassified report

Descriptors: (*Performance tests, Man), (*Tracking, Performance tests), Dynamics, Effectiveness, Control systems, Display systems, Errors.

AD-419 274 Div. 28
OTS price $3.60

Washington U., St. Louis, Mo.
AN EXPERIMENTAL STUDY OF THREE RESPONSE MODES IN SOCIAL INFLUENCE SITUATIONS,
by Richard H. Willis and E. P. Hollander.
Feb 63, 32p.
Contract Nonr81612
Unclassified report

Descriptors: (*Group dynamics, Social communication), (*Adjustment (Psychology)), (*Behavior, Control).

The object of this experiment was to manipulate simultaneously a number of independent variables so as to elicit one of the three basic modes of reacting from each of the three experimental groups. Conditions for one group were designed to maximize conformity, those of the second to maximize independence, and those of the third to maximize anticonformity. The prediction that these reactions can be brought under experimental control and can be substantially and differentially produced in the laboratory was confirmed. Differences among experimental groups were sizeable as measured either by over-all differences in independence and net conformity or by movement scores. In the case of the condition designed to maximize independence behavior, the theoretical limit was closely approached. For the conformity and anticonformity groups, the respective limits were less closely approached, but magnitudes of movement towards these limits were larger than in the case of the independence group. (Author)

AD-419 305 Div. 28, 23
OTS price $2.60

University of Southern Calif., Los Angeles.
THE RELATIVE EFFICIENCY OF DIFFERENT COMBINATIONS OF PROMPTING AND CONFIRMATION FOR LEARNING A BOOLEAN ALGEBRA PROGRAM,
by Joseph W. Rigney and Irving J. Budnoff.
Feb 62, 21p. Technical rept. no. 34
Contract Nonr22822, Proj. NR153 093
Unclassified report

Descriptors: (*Learning, Effectiveness), Theory, Statistical analysis, Feedback.

This study investigated the effects of prompting (P) and confirmation (C), and of three combinations (PP, PC, and CC) of these in the learning of a Boolean algebra program. It was hypothesized that: (1) the PC combination would be superior to the CC combination for acquisition of associations, and to the PP combination for retention of associations; (2) the PC and CC combinations would produce higher transfer scores than the PP combination; and (3) the brightest students would be less affected by these combinations of experimental variables than the other students. None of the above hypotheses was confirmed by analysis of the main effects of the experimental treatments. Tests of the simple effects of these treatments revealed evidence contradictory to the first part of the first hypothesis. In the case of the third hypothesis, the acquisition scores of the upper intelligence group were differentially affected by the experimental treatments. Differences were statistically significant, although they were of smaller absolute magnitude than corresponding differences in the other two intelligence groups. (Author)

AD-419 333 Div. 28, 23
OTS price $6.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A MULTIDIMENSIONAL SCALING ANALYSIS OF THE CIRCUIT TYPES REPAIRED BY NAVAL AVIATION ELECTRONICS TECHNICIANS,
by Douglas G. Schultz and Arthur I. Siegel.
July 63, 53p.
Contract Nonr227900
Unclassified report

Descriptors: (*Performance tests, Test construction (Psychology)), (*Maintenance personnel, Perception), (*Job analysis, Electronics), Circuits.

This is the third in a series of studies investigating the applicability of multidimensional scaling techniques in the job performance area. In this study, the circuits repaired by Naval aviation electronics technicians in the performance of their duties were used as the stimulus materials. Similarity judgments among the circuit pairs were made by supervisory personnel and analyzed by multidimensional scaling methods. It is concluded that it is feasible and fruitful to apply multidimensional scaling techniques to the classification of electronic circuits worked on in the performance of Naval jobs. The avionic circuits repaired by Naval aviation electronics technicians, as represented in the circuit list developed in the study, were perceived as involving sixteen underlying dimensions. (Author)

AD-419 349 Div. 28
OTS price $1.60

Pittsburgh U., Pa.
BEHAVIOR IN GROUPS TEST OF A PROPOSED THEORY OF LEADERSHIP.
Annual rept. no. 8,
by Bernard M. Bass. 15 Nov 62, 11p.
Contract N7ONR35609
Unclassified report

Descriptors: (*Leadership, Theory), (*Behavior, Group dynamics), Test construction (Psychology).

AD-419 351 Div. 28
OTS price $1.10

Georgetown U., Washington, D. C.
THE IDENTIFICATION OF YOUNG LADIES DIAGNOSED AS PERSONALITY AND CHARACTER DISORDERS, THROUGH THE USE OF THE PROVERBIAL ATTITUDES TEST,
by John H. Rohrer. Aug 62, 4p.
Contract Nonr153007
Unclassified report

Descriptors: (*Personality, Test construction (Psychology)), (*Attitudes, Identification), (*Mental disorders, Diagnosis), (*Military psychology, Women).

AD-419 362 Div. 28, 23
OTS price $4.60

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
ON THE SCHEDULING OF TRAINING CONDITIONS FOR THE ACQUISITION AND TRANSFER OF PERCEPTUAL-MOTOR SKILLS,
by George E. Briggs. 1 Dec 61, 42p.
Contract N61339 836
NTDC 836 1 Unclassified report

Descriptors: (*Training, Display systems), (*Transfer of training, Effectiveness), Feedback, Tracking, Training devices, Experimental data, Performance tests, Motor reactions, Perception, Errors.

In the first study the display aiding technique was manipulated such that the operator tracked first with a completely aided display (he viewed a cursor whose position was dependent on error amplitude, error rate, and error acceleration); he then transferred to a partially aided display (error amplitude plus error rate), and finally he tracked with a nonaided display (error amplitude being the only determinant of cursor position). In the second study augmented feedback in the form of auditory clicks was manipulated

such that the operator first recieved clicks when error amplitude was within specified bounds; he then transferred to a situation wherein augmented feedback occurred only if both error and error rate were within bounds; he next experienced augmented feedback only if error, error rate, and error acceleration were within bounds; and finally, all augmented feedback was withdrawn. The results of the experiment were negative in that the augmented feedback groups were inferior in performance to a control group which did not receive this additional information. However, a third experiment did demonstrate that augmented feedback based on the most complex criterion (amplitude, rate, and acceleration) does lead to superior performance. Thus, an inappropriate scheduling of augmented feedback conditions, not augmented feedback per se, accounts for the negative results. (Author)

AD-419 364 Div. 28
OTS price $5.60

Vanderbilt U., Nashville, Tenn.
STUDIES IN ABSTRACTION LEARNING: III. THE TRANSFER OF PERCEPTUAL VERSUS ABSTRACTION LEARNING,
by Stanford C. Ericksen. Aug 59, 52p. Technical rept. no. 5
Contract Nonr214901
Unclassified report

Descriptors: (*Learning, Effectiveness), (*Transfer of training), (*Perception, Measurement), Test methods.

The three experiments in this series, Studies in Abstraction Learning, are directed at the basic behavior difference between perception and the abstraction process. A laboratory procedure was developed to observe and measure perception perception and abstraction learning in a controlled setting. The results show no essential difference in efficiency of original learning between the perception learning group (fixed start, normal vision) and the abstraction learners (blindfolded and/or variable start). The transfer testing clearly established the superior transferability and generality of abstraction learning. (Author)

AD-419 368 Div. 28
OTS price $10.10

Educational Testing Service, Princeton, N. J.
MANUAL FOR KIT OF REFERENCE TESTS FOR COGNITIVE FACTORS (REVISED 1963),
by John W. French, Ruth B. Ekstrom and Leighton A. Price. June 63, 123p.
Contract Nonr221400, Proj. NR151 174
Unclassified report

Descriptors: (*Performance tests, Handbooks), (*Psychometrics, Instruction manuals), Factor analysis, Test construction (Psychology), Aptitude tests, Achievement tests.

The purpose of the Kit is to provide research workers with a set of tests for defining each of these factors. It is intended that use of the Kit tests for this purpose will facilitate interpretation and the confident comparison of one factor study with another. (Author)

AD-419 369 Div. 28
OTS price $8.60

Washington U., Seattle.
COMPARABILITY OF FACTOR STRUCTURE OF PERSONALITY ITEMS UNDER VARIED INSTRUCTIONS,
by Max L. Hillmer, Jr. May 60, 82p.
Contract Nonr47708; Grant M743C5
Unclassified report

Descriptors: (*Personality, Performance tests), (*Test construction (Psychology), Factor analysis), Test methods, Measurement, Psychometrics.

A method of demonstrating the common factor structure of three or more data matrices developed by Horst was applied to a set of personality items administered with three different sets of instructions. The principal axis factors underlying each of the three forms of the questionnaire were determined and the resulting factor loading matrices were rotated by an analytic method so that the corresponding factors from each subtest were maximally correlated and the non-corresponding factor correlations were minimized. Six common factors were established. Applications of this method to situations where several measurement techniques are used on a single group or a single technique is used on several groups were indicated. (Author)

AD-419 427 Div. 28, 23
OTS price $6.60

American Inst. for Research, Palo Alto, Calif.
LEARNING VIA PROGRAMED READING,
by Wayne Hershberger. July 63, 32p. Rept. no. AIR C28 7 63TR; Technical rept. no. 5
Contract Nonr307700
Unclassified report

Descriptors: (*Learning, Test methods), (*Reading, Scheduling), Training, Effectiveness.

Technical Report No. 5 describes the finding that discursively written texts programed to include (a) heterogeneous typography highlighting essential core content, and (b) self-evaluational response items quizzing the reader on the core content, were considerably more effective in teaching the essential material than discursively and tersely written texts incorporating neither program characteristic. Technical Report No. 6 describes the findings of a follow-up study designed to assess the relative effectiveness of typographical cueing versus self-evaluational responding on the learning and retention of essential lesson content in both discursively and tersely written texts. It was found that under no conditions did typographical cueing increase either the efficiency or the effectiveness of the texts. On the other hand, irrespective of lesson topic, writing style, typography, or reading ability, self-evaluational responding facilitated both the learning and retention of the content over which the reader was quizzed. (Author)

AD-419 587 Div. 28
OTS price $1.60

Vanderbilt U., Nashville, Tenn.
STUDIES IN ABSTRACTION LEARNING: II -- THE RELATIVE DIFFICULTY OF ''PLACE'' AND ''RESPONSE'' LEARNING IN A HUMAN TEMPORAL MAZE,
by Stanford C. Ericksen and Charles R. Porter. Aug 59, 12p. Technical rept. no. 4
Contract Nonr214901
Unclassified report

Descriptors: (*Learning, Analysis), Performance tests, Test methods, Theory.

This was a methodological study and one dominated by operationally defined conditions of perceptual

(Place) learning and abstraction (Response) learning. The experimental objective was to compare the learning difficulty of a temporal series of Place versus Response decisions. Both tasks involved some degree of abstracting, at least counting, but the Place learners were required to utilize objective, environment cues while the Response learners ignored these external cues and controlled their learning by a self-generated set of directional cues, i.e. to go right or to go left. There were no significant differences in performance scores between the two groups being tested in these walking maze tasks. Within the limits of such a learning situation, it appears that the dependent variable responses that help define abstraction learning are no more difficult to acquire than are those responses, verbal or otherwise, which serve to define perception learning. (Author)

AD-419 606 Div. 28
OTS price $1.10

Bethany Coll., W. Va.
ON THE SPAN OF A SEARCH MECHANISM IN PROBLEM SOLVING,
by Wilbert S. Ray. Dec 58, 9p. Technical rept. no. 1
Contract Nonr2315 00
Unclassified report

Descriptors: (*Learning), (*Dcision making, Psychology), Stress (Psychological), Scientific research, Analysis of variance.

AD-419 624 Div. 28
OTS price $3.60

Vanderbilt U., Nashville, Tenn.
STUDIES IN TRANSFER LEARNING; EFFECT OF METHODS OF INSTRUCTION ON OPERATOR PROFICIENCY,
by Clarence Cyr, Leland E. Thune and Stanford C. Ericksen. Nov 57, 37p. Technical rept. no. 1
Contract Nonr214901
Unclassified report

Descriptors: (*Learning, Effectiveness), Transfer of training, Test methods, Performance tests, Operators (Personnel).

The purpose of this study was to determine the relative effectiveness of two contrasted methods of instruction on the learning, retention, and transfer of complex operator skills. The two methods represent forms of self study exercises and can be characterized as Rote (concrete or perceptual learning) and Concept (learning of principles and generalizations). The results of the study leave little doubt that the two instructional methods, rote and conceptual, had different effects upon performance at all three stages of the experiment-initial learning, retention, and transfer. It seems to us that part of the impact of these results rests with the reversal in rank order performance that occurred between the Initial Proficiency test and the Retention and Transfer tests. (Author)

AD-419 681 Div. 28, 16
OTS price $2.60

Duke U., Durham, N. C.
A PHYSIOLOGICAL EFFECT OF COGNITIVE DISSONANCE UNDER STRESS AND DEPRIVATION,
by Mary L. Brehm, Kurt W. Back and Morton D. Bogdonoff. 1963, 21p. Technical rept. no. 8
Contract Nonr118111, Projs. NR177 470 and M5356
Unclassified report

Descriptors: (*Adaptation (Physiology), Adjustment (Psychology)), (*Adjustment (Psychology), Stress (Physiology)), (*Fatty acids, Measurement), (*Starvation, Appetite).

An experiment and a partial replication were conducted to relate the change of motivation due to dissonance reduction and committment to physiological changes. The experimental technique was based on food deprivation studies by Brehm which showed that already deprived individuals who committed themselves to further fasting under conditions of low reward decreased their self-estimates of hunger, while the reverse was true for those given high rewards. In the present study the further deprivation was actually executed, and a physiological measure, the concentration of plasma free fatty acids (FFA), was taken. Results showed that the subjects who were relatively hungry during commitment showed increase in FFA during the additional hunger period. Another measure which could be derived was the ratio of FFA at puncture to a later resting level (indicative of situational stress). This ratio decreased for subjects in the high dissonance condition and increased for those in the low dissonance condition. The data indicate that a person who has convinced himself that he is not so hungry tends to respond physiologically as if he were not hungry. Physiological aspects of a more enduring process, such as hunger motivation, are also affected by justification in a manner consistent with dissonance theory. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-419 287 Div. 29
OTS price $8.10

Corps of Engineers, Washington, D. C.
LAUNDRY, DRYCLEANING, AND FOOD-SERVICE FACILITIES - EMERGENCY CONSTRUCTION.
1 Mar 63, 1v.
CE EM1110 3 565 Unclassified report

Descriptors: (*Cleaning, Army equipment), (*Kitchens, Military requirements), Clothing, Personnel, Water supplies, Water softeners, Machines, Kitchen equipment and supplies, Cooking devices, Design.

This manual prescribes the standards of emergency construction to be used by all elements of the Corps of Engineers for the design of laundries, drycleaning plants, and food-service facilities. These requirements may be altered when necessary to meet special conditions on the basis of good engineering practice consistent with the temporary nature of the construction. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-419 046 Div. 30, 9
OTS price $2.60

Cincinnati U., Ohio.
INSTRUMENTATION AND RECORDING EQUIPMENT USED IN CONJUNCTION WITH THE ARL TWENTY-INCH HYPERSONIC WIND TUNNEL.
Rept. for Aug 61-Dec 62,
by D. L. Brown, K. H. Token, W. Hoelmer, F. R. Tepe, Jr. Sep 63, 21p.
Contract AF33 616 8453, Proj. 7064
ARL 63 162 Unclassified report

Report on Aerothermodynamic Investigations In High-Speed Flow.

Descriptors: (*Hypersonic wind tunnels, Instrumentation), Measurement, Pressure, Transducers, Ionization gages, Heat transfer, Temperature, Thermistors, Thermocouples, Flow visualization, Schlieren photography, Electric discharges, Performance (Engineering), Effectiveness, Hypersonic characteristics, Hypersonic flow.

One of the more serious problems associated with hypersonic wind tunnels of the blow-down variety is the obtaining of reliable pressure and temperature measurements. This report reviews the various types of instrumentation investigated for possible use in the ARL twenty-inch hypersonic wind tunnel and illustrates the advantages and disadvantages of such instrumentation. Various types of flow visualization techniques are also discussed with emphasis on their applicability to possible use in the aforementioned tunnel. A description is also included of the high speed data acquisition system. (Author)

AD-419 094 Div. 30
OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
PATTERN RECOGNITION WITH SELF-ORGANIZING MACHINES,
by Alling C. Foreman. Aug 63, 90p.
AFIT GE EE63 8 Unclassified report

Master's thesis.

Descriptors: (*Pattern recognition, Computers), (*Computer logic, Analysis), (*Integrators (Computers), Effectiveness), Mathematical analysis, Artificial intelligence, Learning.

Most of the pattern-recognition self-organizing machines can be classified as adjustable-weight threshold-logic machines, statistical-switching machines, or correlation machines. A noisy pattern is a pattern that varies slightly from a model pattern that the machine has been taught. Computer simulations of a typical machine from each of three classes indicate that the noisy pattern recognition capabilities are poor for statistical-switching machines, good for threshold-logic machines, best for correlation type machines. A proposed correlation self-organizing machine is simple, learns in one step, and recognizes noisy patterns accurately. (Author)

AD-419 112 Div. 30, 9
OTS price $11.00

Toronto U. (Canada).
HYPERVELOCITY LAUNCHERS, PART I: SIMPLE LAUNCHERS,
by I. I. Glass. May 63, 68p.
Contract AF33 657 7874, Proj. 7065, Task 7065 01
ARL 63 86 Unclassified report

Report on Aerospace Simulation Techniques Research.

Descriptors: (*Hypervelocity guns, Interior ballistics), Shock tubes, Pressure, Hypersonic flow, Particles, Launching, Particle trajectories, Friction, Laminar boundary layer, Turbulent boundary layer, Boundary layer transitions, Mathematical analysis, Hypersonic characteristics.

A critical survey is made of hypervelocity launchers and their research applications to reentry physics, hypervelocity impact, gasdynamics and aerodynamics. The present portion of the survey (Part I) deals mainly with simple launchers (constant area, single stage, light-gas guns) in order to illustrate some of the basic concepts affecting their design and operation. The effects of counterpressure, boundary layer, bore friction, and gas imperfections are considered. It is noted that there are many outstanding problems associated with the possible acceleration of simple aerodynamic models to velocities of 50,000 ft/sec and beyond. It appears that microparticles might be accelerated to supervelocities of 100,000 ft/sec or more by explosive spray or electrodynamic techniques. Subsequent portions of the survey will deal with the topics outlined in the table of contents. (Author)

AD-419 113 Div. 30, 25
OTS price $5.60

Brew, Richard D., and Co., Inc., Concord, N. H.
ULTRASONIC ECHO PATTERNS.
Final technical rept.,
by D. J. Whitney. May 63, 1v.
Contract DA19 0200RD5483, Proj. 5B93 32 004
WAL TR143 5 2 Unclassified report

Descriptors: (*Non-destructive testing, Ultrasonic radiation), (*Ultrasonic radiation, Non-destructive testing), (*Mechanical properties, Glass), Piezoelectric transducers, Fracture (Mechanics), Photomultipliers, Signal-to-noise ratio, Optical equipment, Elasticity.

Ultrasonic echo patterns in circular glass plates, from centrally located voids of various sizes and shapes, were measured using a method of photoelastic detection which does not disturb the field being measured. The frequencies were selected to yield measurement for void sizes representing approximately 1.0, 3.0 and 10 ultrasonic wavelengths. A longitudinal plane wave, generated by a transducer bonded to the periphery of the blank, was made to strike the void; and angular patterns of reflected waves were measured for both longitudinal and transverse waves. For rectangular voids, patterns were measured for incident angles of 0, 15, 30, and 45 degrees relative to the major surface of the void. Analysis is made of signal to noise ratio determining the minimum detectable signal, and the effect of random strains in the material on the accuracy of the measurements. The results are presented in the form of 27 polar plots of reflected level in terms of decibels down from the incident signal. (Author)

AD-419 132 Div. 30, 25
OTS Price $1.10

X-Ray And Crystal Analysis Lab., Pennsylvania State U., University Park.
A PROGRAM FOR PREPARATION OF A MODERNIZED VERSION OF GROTH'S CHEMISCHE KRISTALLOGRAPHIE,
by R. Pepinsky. 15 Oct 58, 3p.
Contract AF49 638 416
Unclassified report

Descriptors: (*Crystal structures, Programming (computer)), Recording systems, Computers, Research program administration.

AD-419 134 Div. 30, 26
OTS price $1.60

Assembly Products, Inc., Chagrin Falls, Ohio.
PRODUCTION ENGINEERING MEASURE FOR METERS, TAUT-BAND SUSPENSION, A-C MOVING IRON VANE PER SIGNAL CORPS REQUIREMENTS SCS-160.
Quarterly progress rept., 1 May-31 July 63,
by R. H. Nichols. 31 July 63, 7p.
Contract DA36 039AMC01473E
Unclassified report

Descriptors: (*Meters, Manufacturing methods), (*Manufacturing methods, Meters), Industrial production, Model test, Electrical properties.

A preliminary sample was designed and constructed in order to study various parameters of AC moving-iron vane meters. Initial evaluation of the electrical characteristics of the prototype mechanism showed that the basic design meets the electrical specifications. (Author)

AD-419 157 Div. 30, 25
OTS price $1.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
INSTRUMENTATION FOR DIFFRACTION, MICRO-OPTICAL, MORPHOLOGICAL AND DIELECTRIC INVESTIGATIONS OF CRYSTALS,
by R. Pepinsky, K. Drenck, H. Diamant, S. Hoshino, and T. Mitsui. 17 July 57, 2p.
Contract AF18 603 35
Unclassified report

Abstract for Congress, International Union of Crystallography, Montreal, July 10-17, 1957.

Descriptors: (*Instrumentation, Diffraction), (*Crystals, Diffraction analysis), Optical instruments, Abstracts.

AD-419 183 Div. 30, 5
OTS price $2.60

Mitre Corp., Bedford, Mass.
DATA RELIABILITY OF THREE BELL A1 MAGNETIC TAPE RECORDING SYSTEMS,
by H. L. Preble. Sep 63, 15p. Rept. no. W5442
Contract AF33 600 39852
ESD TDR63 172 Unclassified report

Descriptors: (*Magnetic recording systems, Magnetic tape), (*Data storage systems, Reliability), Digital systems, Data transmission systems, Tests, Telephone lines.

This paper tabulates the results of initial tests conducted to determine the data reliability of three methods of recording Bell A1 digital data on magnetic tape. The tests were designed only to find an approximate figure for error rate in that the following parameters were held constant: (1) type tape, (2) tape age, (3) position of information across tape (channel effects), (4) position of information along tape (reel effects), and (5) word length. More tests are necessary to determine the effect of these parameters on error rate. The results show that the three recording systems tested are adequate for their application. (Author)

AD-419 198 Div. 30, 16
OTS price $9.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION INTO PATTERN INVARIANCE RECOGNITION CAPABILITIES OF THE HUMAN VISUAL SYSTEM,
by William L. Harrison. Aug 63, 111p.
AFIT GE EE63 11 Unclassified report

Master's thesis.

Descriptors: (*Pattern recognition, Vision), (*Vision, Pattern recognition), (*Digital computers, Models (Simulations)), (*Bionics, Vision).

The purpose of this investigation is to find out how the human visual system performs pattern invariance recognition. A detailed study of the human visual system is made, a model of a portion of this system is derived, the model is simulated on a digital computer and tested to determine its pattern invariance recognition capabilities. The results indicate that the model recognizes patterns when translated slightly, rotated small amounts, or varied slightly in size and shape; however, its capabilities are far short of those of the human visual system. A recommendation is made for revising the model for further investigation. (Author)

AD-419 218 Div. 30, 16
OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PHYSICAL TRANSDUCERS FOR SENSING OXYGEN,
by Louis F. Johnson, Jr., J. Ryan Neville, Richard W. Bancroft and Thomas H. Allen. Aug 63, 11p. Review 8 63
Unclassified report

Descriptors: (*Oxygen, Reviews), (*Reviews, Oxygen), (*Transducers, Oxygen), Detection, Tolerances (Physiology), Physiology, Measurement, Electrochemistry, Materials, Nylon, Sensitivity, Shock (Mechanics), Specifications.

AD-419 314 Div. 30, 22
OTS price $1.60

Pitman-Dunn Inst. for Research, Frankford Arsenal, Philadelphia, Pa.
A STUDY OF MACRO-PARTICLE ACCELERATION WITH SEQUENCED HIGH EXPLOSIVE IMPULSES. OPTIMIZATION OF SINGLE STAGE GEOMETRY,
by Warren E. Fogg. July 63, 13p.
DA Proj. 50201008
PDIR MR M64 5 1 Unclassified report

Descriptors: (*Hypervelocity projectiles, Shaped charges), Velocity, Damage, Impedance matching, Particles, Aluminum, Explosive actuators, Hypervelocity guns, Acceleration.

A single stage high explosive system for accelerating macroparticles has been designed and tested in order to investigate the various parameters. Velocities to 7500 fps were achieved with an aluminum projectile weighing approximately 4.5 grams. Damage to the projectiles became so great (mass losses to 40%) that the program was halted. Suggestions are made to show how the methods of acoustical impedance matching could help prevent projectile break-up. (Author)

AD-419 400 Div. 30
OTS price $1.20

Naval Ordnance Lab., White Oak, Md.
PRESSURE-PULSE GENERATOR FOR THE CALIBRATION OF

PRESSURE GAGES,
by P. M. Aronson and R. H. Waser. 8 Aug 63, 4p.
NOL TR63 143 Unclassified report

Descriptors: (*Pressure gages, Calibration), (*Test equipment, Pressure gages), Piezoelectric gages, Time, High pressure research, Vacuum.

A pressure gage calibration device is described which is especially useful for piezoelectric-type gages having short RC decay time. The device produces a positive going, isothermal pressure pulse which is in the form of a step pulse with a rise time of less than 100 microseconds. Calibration pressures from 0.1 psi to 1,000 psi are obtainable using any gas as a working medium. Provision is made for simulating ambient pressures from high vacuum to several hundred psi during calibration. (Author)

AD-419 410 Div. 30
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
ALL-MAGNETIC SHIFT REGISTER SCHEME STUDIES,
by E. K. Van De Riet. July 63, 52p. Technical rept. no. 4
Contract Nonr271200, SRI Proj. 2697
Unclassified report

Descriptors: (*Computer storage devices, Magnetic cores), (*Switching circuits, Magnetic cores), Networks, Tables, Computer logic, Programming (Computers), Magnetic core storage, Mathematical logic.

A method of cataloging and synthesizing all-magnetic shift register circuits is described and demonstrated. The cataloging procedure provides a consistent organization of known schemes, and the synthesis process generages all possible shift register shemes in a given category. Scheme as used here relates to the sequence of switching of the various elements of particular configuration to accomplish shifting in a register. The term is defined more completely in the report. The synthesis process was applied to three different configurations of magnetic toroids and wire coupling loops. It was applied only to the three-clock-phase schemes in these configurations. Two new schemes were synthesized in addition to two that were already known. Application of this synthesis technique to more complicated configurations should result in more interesting and more practical circuits. (Author)

AD-419 477 Div. 30, 15
OTS price $9.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
LISP 1.5 PROGRAMMER'S MANUAL,
by John McCarthy, Paul W. Abrahams, Daniel J. Edwards, Timothy P. Hart and Michael I. Levin. 17 Aug 62, 99p.
Contract DA36 039sc78108, Task 3 99 25 001 08
Unclassified report

Descriptors: (*Programming languages, Data processing systems), (*Mathematics, Programming languages), Data storage systems, Mathematical logic, Functions, Control sequences, Compilers, Punched cards.

The LISP language is designed primarily for symbolic data processing. It has been used for symbolic calculations in differential and integral calculus, electrical circuit theory, mathematical logic, game playing, and other fields of artificial intelligence. LISP is a formal mathematical language. It is therefore possible to give a concise yet complete description of it. Such is the purpose of this first section of the manual. Other sections will describe ways of using LISP to advantage and will explain extensions of the language which make it a convenient programming system. (Author)

AD-419 487 Div. 30
OTS price $8.60

RAND Corp., Santa Monica, Calif.
SOVIET CYBERNETICS TECHNOLOGY: III, PROGRAMMING ELEMENTS OF THE BESM, STRELA, URAL, M-3, AND KIEV COMPUTERS,
tr. by A. S. Kozak. Sep 63, 70p. Memo. no. RM3804PR
Contract AF49 638 700
Unclassified report

Report on Project RAND. Trans. from Elementy Programmirovaniya, B. V. Gnedenko, V. S. Korolyuk, E. L. Yushchenko, Fizmatgiz, Moscow, p. 346, 1961.

Descriptors: (*Cybernetics, Command and control systems), (*Computers, Specifications), Computer logic, Programming (Computers).

This Memorandum is a translation of the Appendix of the book, Elements of Programming. The book itself is a general introduction to the subject of electronic computing, with particular emphasis on serving as a guide to programmers. It is intended for use by university students and students in advanced technological institutions. The interesting feature of the book is the Appendix, which details the command structures and systems of notation for the five Soviet computers: BESM, Strela, Ural, M-3, and Kiev. Additionally, some specifications for each of the computers are included. The Introduction prepared by the editors of the Soviet Cybernetics Technology series contains summaries of the operations codes for the five machines in chart form. It also contains comments on the problems one encounters in trying to make analyses of the Soviet state of the art, pointing out the vast differences that are found when comparing two different authors' comments on the same machine. (Author)

AD-419 491 Div. 30, 25, 14, 26
OTS price $.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
PLASMA JET WELDING, COATING, AND CUTTING: AN ANNOTATED BIBLIOGRAPHY,
comp. by Scott J. Buginas. Feb 63, 20p. Rept. no. 5 73 63 4; SB63 21
Unclassified report

Descriptors: (*Plasma jets, Welding), (*Coatings, Plasma jets), (*Cutting tools, Plasma jets), (*Bibliographies, Plasma jets), Electrodes, Cathodes, Bearings, Alloys, Corrosion inhibition, Machining, Flame spraying, Underwater cutting, Toxicity, Torches, Processing.

The search was made in the literature of 1960 - 1962. News-release type articles were included because of our interest in manufacturing applications. Anonymous articles are interfiled alphabetically by title within the bibliography which is arranged alphabetically by author. (Author)

AD-419 517 Div. 30, 9
OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
BOUNDARY-LAYER CHARACTERISTICS AT MACH NUMBERS 2 THROUGH 5 IN THE TEST SECTION OF THE 12-INCH SUPERSONIC TUNNEL (D),
by D. R. Bell. Sep 63, 16p.
Contract AF40 600 1000, ARO Proj. VD2257
AEDC TDR63 192 Unclassified report

Descriptors: (*Supersonic wind tunnels, Boundary layer), (*Boundary layer, Supersonic wind tunnels), Calibration, Measurement, Pitch, Rotation, Thickness, Momentum, Reynolds number, Experimental data.

As part of a general tunnel calibration program, an investigation was made of the boundary-layer characteristics at Mach numbers 2, 3, 4, and 5 in the test section of the 12-Inch Supersonic Tunnel (D). The boundary-layer measurements were made at one longitudinal station (near the pitch sector center of rotation) on the centerline of both the flexible plate and sidewall. Measurements were also made at vertical locations on the sidewall between the sidewall centerline and the upper flexible plate. The boundary-layer total thickness, displacement thickness, and momentum thickness are presented at each Mach number over a Reynolds number range corresponding, in general, to tunnel stagnation pressures between 5 and 60 psia. At each Mach number, the variation of displacement thickness on the sidewall between the centerline and the upper flexible plate is presented as is a correlation of the flexible plate displacement thickness with experimental data obtained in other wind tunnels. Velocity profiles and test section Mach numbers are presented to indicate variations with Reynolds number. (Author)

AD-419 550 Div. 30
OTS price $9.10

Naval Research Lab., Washington, D. C.
A PROGRAM FOR THE EXECUTION OF LGP-30 MACHINE-LANGUAGE CODES ON THE NAREC COMPUTER,
by Elizabeth E. Wald and B. Wald. 1 July 63, 107p.
NRL Rept. no. 5919 Unclassified report

Descriptors: (*Programming (Computers)), (*Programming languages), Coding, Digital computers, Simulation.

In order to allow the utilization of digital computer programs written for the LGP-30 computer by an organization which no longer had convenient access to this machine, a program was written for NAREC, the NRL general prupose computer, which causes NAREC to simulate the actions of an LGP-30. Although this program was written out of necessity, the simulation speed gain is sufficiently high to make the simulation of LGP-30 operations more economical than direct execution for many classes of problems. A more cogent argument for the utilization of simulation is to free NRL's LGP-30's from production work and allow them to be used in close support of research. The simulator utilizes the LGP-30 instructions in an interpretive mode to invoke subroutines or action blocks to perform on the simulated LGP-30 memory, registers, and input-output devices the same actions that would have been performed by an actual LGP-30 executing these instructions. One year of operating experience with the simulator has demonstrated that while there certainly exist better ways of providing interchangeability between computers, e.g., by not programming in machine-oriented language, it is practical to use the actual machine coding of a problem written for a small computer as the control for a larger computer running an interpretive program. (Author)

AD-419 553 Div. 30
OTS price $3.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS). VOLUME II - CONSOLES.
Quarterly rept. no. 4.
Sep 62, 28p.
Contract AF19 626 10
Unclassified report

Descriptors: (*Data processing systems, Computers), Transducers, Display systems, Programming (Computers), Computer logic, Input-output devices, Human engineering, Design.

Some general characteristics of consoles when used as transducers between human beings and information processing devices are reviewed. Test of a specific console designed for independent ''off line'' use, the Datacom Model 408-2 is described. (Author)

AD-419 580 Div. 30, 32
OTS price $8.60

Joint Publications Research Service, Washington, D. C.
ACADEMY OF SCIENCES USSR: REVIEW OF 1958 ACTIVITIES.
1959, 1v.
JPRS Rept. no. 974D Unclassified report

Trans. from Vestnik Akademii Nauk SSSR, Apr-May 59.

Descriptors: (*Scientific research), Symposia, Scientific organizations, Scientific personnel, Research program administration.

AD-419 597 Div. 30, 9
OTS price $9.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE PERFORMANCE OF A CONVERGENT-DIVERGENT NOZZLE IN A SHOCK TUBE,
by Robert Kincaid Wright. Aug 63, 107p.
AFIT GAE/ME/63 12 Unclassified report

Master's thesis.

Descriptors: (*Converging-diverging nozzles, Shock tubes), Performance (Engineering), Aerodynamic characteristics, Shock waves, Test equipment, Schlieren photography, Design, Hypersonic flow, Hypersonic characteristics, Test methods, Oscilloscope, Helium, Fluid flow.

An investigation was conducted to determine the performance of a Mach 4, converging-diverging, sharp-edge-throat nozzle modification to the Mechanical Engineering Department shock tube. Mach Number measurements were made in the exit plane of the nozzle with a two-dimensional wedge and flow field pictures were recorded using a folded Schlieren system and high-speed motion picture photography. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-419 085 Div. 31, 9
OTS price $21.00

RCA Defense Electronic Products, Burlington, Mass.
MECHANICAL HYDROFOIL CONTROL SYSTEM PRELIMINARY DESIGN STUDY PROGRAM.
Final rept.
July 63, 1v. Rept. no. CR588 93
Contract NObs86448, Proj. SF013 09 05, Task 2637
Unclassified report

Descriptors: (*Hydrofoils, Suspension devices), (*Hydrofoil boats, Hydrofoils), Feasibility studies, Stabilization systems, Stability, Control simulators, Control surfaces, Control systems, Central, Hydrodynamics, Motion, Lift, Drag, Mathematical analysis, Human engineering, Automatic, Marine rudders, Gyroscopes.

Methods were investigated for improving the open loop behavior of hydrofoil craft with emphasis on three different foil suspension techniques and to conduct feasibility and preliminary design studies applying these techniques to the Bureau of Ships 15-ton high-speed test craft (FRESH) for stabilization and control, both manually and automatically, in a State 3 Sea. The three suspension techniques are basically mechanical in nature and have the property of providing a non-rigid connection in one degree-of-freedom between the foil and the hull. In the case of the sprung (or heaving) foil, roughly vertical heaving can be used to minimize angle-of-attack variations normally induced by wave orbital motion. The freedom to rotate of the pivoted (or hinged) foil and the kite foil gives these configurations the potential for reducing induced angle-of-attack variations. Preliminary studies of these three basic foil suspension schemes were conducted to determine their relative merits with respect to their ability to counteract the influences of wave particle orbital motion disturbances on the foil and minimize the resulting forces on the hull. Stability with regard to individual foil response was considered, particularly for the case of the kite foil in supercavitating flow. (Author)

AD-419 528 Div. 31, 18
OTS price $9.10

George Washington U., Washington, D. C.
SHIP REGULAR OVERHAULS,
by J. E. Hamilton. 4 Oct 63, 104p. Serial T164
Contracts Nonr76103 and Nonr76105, Projs. NR345 107 and NR047 1001
Unclassified report

Descriptors: (*Maintenance, Ships), (*Ships, Maintenance), Logistics, Submarines, Casts, Tables.

A study of ship regular overhauls and the factors involved is presented. A thorough presentation is made of data concerning six regular overhauls of one ship, the U.S.S. TIRW(SS-416). (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-419 354 Div. 32, 18, 30
OTS price $4.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS). VOLUME I.
Progress summary rept. no. 6, 16 Nov 62-15 Feb 63. 37p.
Contract AF19 626 10
Unclassified report

Descriptors: (*Data processing systems, Military facilities), (*Reading machines, Computer logic), (*Pattern recognition, Reading machines), (*Computers, Programming language), (*Information retrieval, Effectiveness), (*Data storage systems, Design), (*Compilers, Statistical analysis), Mathematical prediction, Teaching machines, Statistical data, Mathematical models, Classification, Documentation, Computer logic, Automation, Standards.

AD-419 444 Div. 32
OTS price $5.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
STORAGE AND RETRIEVAL OF TECHNICAL INFORMATION.
Interim technical rept.,
by Andries van Dam. 1 Sep 63, 1v. Rept. no. 63 22
Contract Nonr551 40
Unclassified report

Descriptors: (*Naval procurement, Records), (*Information retrieval, Records), Mechanical drawings, Microfilm, Punched cards.

A study of a large-scale information retrieval system for technical information at the Aviation Supply Office was made. In particular, the processing of Technical Data Requests (TDR) by the Technical Division (TE) was examined, and both an overview of the present situation and recommendations for improvement of the system are given. Generally, the process can be divided into two phases: (1) the study of equipment folders, handbooks, and other library material in the technician's own building, and (2) the study of blueprints and specifications in the Naval Air Technical Services Facility repository (NATSF). The recommendations for the first phase are twofold: (1) to standardize and reform TDR information to the technician and (2) to eliminate the non-standardized, hard-copy storage of equipment case-histories and associated information through the purchase of a semi-automatic microfilm retrieval system, and the prerequisite reorganization of the process. (Author)

AD-419 588 Div. 32, 12
OTS price $13.00

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
LIST OF TECHNICAL DOCUMENTS PUBLISHED DURING THE YEARS 1958 THROUGH 1962.
1 June 63, 178p.
Unclassified report

Descriptors: (*Bibliographies, Guided missiles), (*Guided missiles, Bibliographies), Guided missiles (Surface to surface), Rocket motors, Antitank ammunition, Rocket motors (Liquid propellant), Rocket motors (Solid propellant), Launch vehicles (Aerospace), Guided missile warheads, Indexes.

A bibliography of technical documents lists titles of reports published from 1958 through 1962 by the present Army Missile Command (AMICOM), which includes the activities of the Army Rocket and Guided Missile Agency (ARGMA) and the Army Ballistic Missile Agency (ABMA). The bibliography was compiled from library records and responses to requests for document listings from the Re-

search and Development organizations of the Command, and makes no pretense of being a complete coverage. Due to proprietary information restrictions, the formation and later consolidation of ABMA and ARGMA, and the formation of NASA's Marshall Space Flight Center, many reports were never entered or recorded in the library. For example, it is known there were approximately 35 reports in the 4RF series which were evaluations of major industrial technical proposals which do not appear in this published listing. Undoubtedly, many reports written by persons who have left the Command were likewise not entered in the library and were not included in the solicited submissions. (Author)

AD-419 616 Div. 32
OTS price $6.60

RAND Corp., Santa Monica, Calif.
THE EUROPEAN SOVIET BLOC AND THE WEST AS MARKETS FOR PRIMARY PRODUCTS,
by Egon Neuberger. Sep 63, 57p. Memo. no. RM3745PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Communists, Commerce), (*Commerce, Effectiveness), Economics.

In an earlier study the author evaluated this claim by comparing the USSR with seven leading Western industrial countries. The present Memorandum represents an attempt to broaden the analysis by including five Eastern European members of the Soviet Bloc, in order to discover whether the earlier conclusions apply to the European Soviet Bloc as a whole. For the purpose of testing Communist claims, three objective criteria are selected: the size, the growth, and the stability of the market. The performance of the European Soviet Bloc and of the Eastern European countries is compared with that of seven leading Western countries (the United States, United Kingdom, and the Common Market countries), and that of the Common Market countries separately. In the case of the USSR, official trade statistics provided data on both values and quantities of imports, enabling us to test Soviet claims with respect to the total value, the physical quantity, and the unit values of imports. Unfortunately, no Eastern European country provided value data for each of the six years, and this Memorandum can therefore say little about the important measures of performance based on total value and unit value of imports; it focuses on quantity of imports. (Author)

33. TRANSPORTATION

No Entries

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Rollin M. Patton, Dec 63, 23p
N64-11548
OTS $0.75

NASA-TN-D-1974
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
BEHAVIORAL TESTING DURING A 7-DAY CONFINEMENT: THE PATTERN DISCRIMINATION TASK
Rollin M. Patton and Robert J. Randle, Jr. Dec 63, 17p
N64-11549
OTS $0.50

PB-163 960
Institute for Social Research, Univ. of Michigan, Ann Arbor.
FACTORS DETERMINING THE ADOPTION OF DECISION-MAKING AS A ROLE BEHAVIOR: A STUDY OF SCIENTISTS IN A GOVERNMENT ORGANIZATION
Robert S. Weiss. [1954] 15p
[Contract N6ori-232(02)]
AD-42 305
OTS $1.60

DESCRIPTORS: *Decision making, *Attitudes, *Scientific personnel, *Government employees, Job analysis, Employee relations.

A study was made of the factors which determine the way scientists in a government organization structure their jobs. Interviews with scientists in one government research organization indicated that individual preferences were not as important in determining the individual's optional activities as were social pressures based upon the individual's possession of legitimizing characteristics and the attitude of the individual's supervisor. A legitimizing characteristic is defined as an objective attribute of an individual (such as age or length of service in an organization) generally known to the individual's group and considered by the group to be related to the propriety of the individual's performing certain activities. Legitimizing characteristics were found to provide the basis for shared evaluations of the competence of the scientist to make policy decisions. With one exception, all the scientists not required by their superior to perform decision-making activities, but who nevertheless did so, had legitimizing characteristics. Where the supervisor assumed decision-making himself, some of the scientists with legitimizing characteristics competed with him successfully. The legitimizing characteristics appeared important to the scientist in justifying to him and to others his adoption of a particular role. (DDC abstract)

N64-11825
Maryland U., College Park.
A LONG-TERM STUDY OF HUMAN PERFORMANCE IN A CONTINUOUSLY PROGRAMMED EXPERIMENTAL ENVIRONMENT
Jack D. Findley, Bernard M. Migler, and Joseph V. Brady. Nov 63, 114p
Grant NsG-189-61
NASA CR-52913
OTS $9.60

BIOLOGICAL SCIENCES

NASA-TN-D-2063
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE TRANSPORT OF CHEMICALLY REACTING SPECIES IN THE CLASSICAL CAPILLARY
John T. Howe. Dec 63, 36p
N64-11556
OTS $1.00

AD-277 719
Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
INHIBITION OF MITOCHONDRIAL ATP-ase AND ATP-P_i EXCHANGE ACTIVITY WITH TOFRANIL
J. Robert Lyons. 14 Jun 62, 19p
Rept. no. NADC-MA-6206; Rept. no. 17 on Proj. no. MR005.13-0002.7
OTS $1.60

DESCRIPTORS: Drugs, *CNS stimulants, *Psychotropic agents, *Adenosine phosphates, *Phosphorylases, Microsomes, *Phosphorylation, Nerves.

Tofranil acts upon mitochondria in a manner which blocks phosphate group exchange reactions. This suggests that both phosphorylation and dephosphorylation mechanisms depend upon interrelated sites on the mitochondrion and that the direction of the reactions toward phosphorylation or dephosphorylation can be controlled by components in the environmental media which react with these sites. The in vitro action of Tofranil may be related to its psychotherapeutic effects in that the depressed phosphorylation reactions would lower cell membrane potentials and therefore permit a depolarization reaction to occur at a lower incoming impulse level. Alternatively, the results found may represent merely a mechanism for a toxic effect of the drug. (Author)

Medical Specialties and Equipment

PB-163 991
Massachusetts Inst. of Tech., Cambridge.
A TECHNIQUE FOR ELECTRICALLY RECORDING EYE POSITION. Rept. for Jan-Aug 56 and Sep 56-Jul 57, on Operator Performance Under Stressful Environmental Conditions
E. Chirstine Kris. Dec 58, 42p
Contracts AF33(616)3455 and AF33(616)3849
WADC Technical rept. 58-660; AD-209 385
OTS $4.60

DESCRIPTORS: *Eye, *Recording systems, Motion, Oscilloscopes, Mapping, Instrument panels

This report presents a technique for electrically recording eye position and eye movements. The associated instrumentation, including a multichannel d-c differential input oscillograph and a special visual angulometer, is described in detail. Examples of several types of eye-movement recordings are presented, and the method of constructing "isopotential eye-position maps" is outlined. Certain uses of these techniques in studies concerned with variations in the function of the visual system are briefly discussed. (Author)

PB-165 030
Public Health Service, Washington, D. C.
TIME RECORDING PILL CALENDAR (INTERVAL TIMING PRINCIPLE). Invention rept.
Thomas Staver Moulding, Jr. and Gardner Middlebrook. [1963] 3p
Case no. GPB 6-104
OTS $1.10

DESCRIPTORS: *Time-interval counters, *Drugs, *Containers, Photographic recording systems.

This design combines the advantages of the pill calendar with the time recording pill dispenser.

PB-165 050
Saint Louis Univ., Mo.
THE SAINT LOUIS UNIVERSITY PERIODONTAL MANAKIN. A PRE-CLINICAL TEACHING AID
Jules M. Snitzer. 5 Dec 63, 4p
OTS $1.10

An invention description.

DESCRIPTORS: *Artificial dentures, *Dentistry, Models (Simulations), Education, *Anatomical models,

AD-294 618
[Army Biological Labs.] Frederick, Md.
BIBLIOGRAPHY ON RUSSIAN SPRING-SUMMER (TICK BORNE) ENCEPHALITIS. Rept. for 1938-Nov 52
1 Dec 52, 41p
OTS $4.60

DESCRIPTORS: *Bibliographies, *Encephalitis, Disease vectors, *Ticks.

PB-165 047
National Research Council [Washington, D. C.]. Div. of Medical Sciences
PRIMATE MALARIA
S. D. Aberle. Mar 45, 187p
OTS $13.00

DESCRIPTORS: *Malaria, *Primates, *Bibliographies, Parasites, Metabolism, Chemotherapeutic agents, Immunity, Morphology (Biology),

Contents:
Parasites, hosts, vectors and transmission of parasites
Metabolism of Plasmodium knowlesi
Clinical course
Chemotherapy of primate malaria
Immunity
Pathology
Morphology
Macaques
Bibliography (app. 400 refs)

CHEMISTRY

N64-10179
Aerojet-General Corp., Azusa, Calif.
RESEARCH ON PROCESSES FOR UTILIZATION OF LUNAR RESOURCES. Quarterly rept., 22 Apr-31 Jul 63
S. D. Rosenberg, G. A. Guter, and F. E. Miller.
Aug 63, 29p
Contract NAS7-225
Report no. 0765-01-1; NASA CR-52318
OTS $2.60

N64-11325
MSA Research Corp., Callery, Pa.
ELECTROLYTIC PRODUCTION OF OXYGEN AND REDUCTION OF CARBON DIOXIDE. Final rept.
R. E. Shearer, C. A. Palladino, and J. C. King.
4 Jun 63, 38p
Contract NASr-70
MSAR-63-82; NASA-CR-52878
OTS $3.60

PB-163 987
Stanford Research Inst. [Menlo Park, Calif.]
THE THERMODYNAMIC PROPERTIES OF MOLTEN SALTS: PART I. MOLYBDENUM HEXAFLUORIDE. Rept. for Jun 54-Oct 55
A. P. Brady, J. K. Clauss, and O. E. Myers. Sep 57
56p
Contract AF33(616)2558
WADC Technical rept. 56-4, Part I; AD-131 096
OTS $5.60

DESCRIPTORS: *Fused materials, Salts, *Molybdenum compounds, *Fluorides, *Thermochemistry, Transition temperature, Heat of formation, Entropy, Cryostats, *Calorimeters, *Thermocouples, Design,

Assembling and testing of apparatus for measuring heat capacities from about 50°K to room temperature has been completed, including calibration of thermocouples by comparison with a Pt resistance thermometer and with a Cu one. This apparatus has been used to determine the absolute entropy of MoF_6 vapor at 298.16°K. The result, 79.7 ± 0.6 cal/mole. deg, agrees well with that calculated from its spectrum, 80.05 cal/mole. deg. A previously unreported solid-solid transition was found to occur at 263.6°K (-9.6°C). A solution calorimeter has also been assembled and tested. By comparison of the heat of solution in sodium hydroxide of MoF_6 with that of the oxide, the heat of formation of MoF_6 at 298.16°K was found to be -390.9 kcal/mole. From these values the corresponding standard free energy of formation is computed to be -363.1 kcal/mole. These data, together with data in the literature, have allowed calculation of the desired thermodynamic functions over the temperature range of interest. (Author)

PB-163 988
Stanford Research Inst. [Menlo Park, Calif.].
THE THERMODYNAMIC PROPERTIES OF MOLTEN SALTS: PART II. TUNGSTEN HEXAFLUORIDE, NIOBIUM PENTAFLUORIDE, AND VANADIUM TRIFLUORIDE. Rept. for Nov 55-Sep 56
Orlo E. Myers. Sep 57, 57p
Contract AF33(616)2558
WADC Technical rept. 56-4, Part II; AD-131 097
OTS $5.60

DESCRIPTORS: *Fused materials, Salts, *Tungsten compounds, *Niobium compounds, *Vanadium compounds, *Fluorides, *Thermochemistry, Heat of solution, Heat of fusion, Heat of formation, Enthalpy, *Calorimeters, Design,

Assembly and adjustment of apparatus for measuring enthalpies from 50 to 1200°C has been completed. A new solution calorimeter suitable for use with metallic ampoules for measurements with fluorides has been constructed. An improved low temperature calorimeter has been built with the aid of electroforming techniques. This equipment has been used in conjunction with low-temperature equipment previously described to obtain thermodynamic data for WF_6, NbF_5, and VF_3. (Author) (See also PB-163 987)

EARTH SCIENCES

N64-10613
Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT, AEROBEE NE 3.127
Marjorie McLardie Hoidale. Aug 63, 34p refs
ERDA-65; NASA CR-52377
OTS $3.60

PB-163 950
Institute of Geodesy, Photogrammetry and Cartography, Ohio State Univ. Research Foundation, Columbus.
PRACTICAL COMPUTATION OF GRAVITY AT HIGH ALTITUDES.
Rept. no. 27
R. A. Hirvonen and Helmut Moritz. May 63, 95p
Contract AF19(628)2771
Technical paper no. 1613-1; AFCRL-63-702; N63-23092
OTS $8.60

DESCRIPTORS: *Gravity, Gravity anomalies, *Geodesics, Measurement, Numerical methods and procedures, Special functions (Mathematical), Geophysics, High altitudes, Errors.

Methods for computing the gravity vector outside the earth are presented and compared. For the purpose of computation, gravity is split up into normal gravity and gravity disturbance. The report first gives a practical method for computing normal gravity. For gravity disturbances, different methods are described and compared by means of accuracy studies (on influence of distant zones, etc.); finally a practical computation procedure is given. (Author)

Physics of the Atmosphere

N64-11324
Chicago U., Ill.
THE FORMATION OF MID-LATITUDE SPORADIC-E LAYERS
C. O. Hines. [1963] 4p
Grant NsG-467
NASA CR-52564
OTS $1.10

N64-11074
Geophysics Corp. of America, Bedford, Mass.
REQUIREMENTS OF ELECTRON DENSITY PROFILE IN THE NIGHTTIME E REGION
L. G. Smith. Jun 63, 24p
Contract NASw-489
GCA Technical rept. no. 63-22-N; NASA CR-52553
OTS $2.60

Presented at the Spring URSI Meeting, Washington, 1 May 63.

N64-10297
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
EVIDENCE FOR THE EFFECT OF CORPUSCULAR RADIATION ON THE IONOSPHERE. Statistical Analysis of Ionospheric Data, 1937-1957
F. Mariani. May 63, 40p
X-615-63-94; NASA TM-X-51058
OTS $3.60

PB-163 955
Michigan Univ., Ann Arbor.
THE TRANSMISSION OF THERMAL RADIATION THROUGH REAL ATMOSPHERES. Annual rept.
Stuart W. Churchill, Jin H. Chin, George C. Clark, Bert K. Larkin, and James A. Leacock. Apr 57, 81p
Contract Nonr-1224(17)
AFSWP 1035; AD-156 131
OTS $8.10

DESCRIPTORS: *Thermal radiation, Transport properties, *Atmosphere, Absorption, Scattering, Aerosols, Meteorological phenomena, Equations, Mathematical analysis.

The transmission of radiation from plane-parallel, point and spherical sources through real atmospheres is investigated theoretically. The atmosphere is treated as a uniform, parallel-plane dispersion of finite height situated above a diffusely reflecting surface. Both scattering and absorption are considered. Analytical solutions are developed by utilizing a two-component representation for the intensity with a second pair of components for the radiation reflected by the surface. Effective scattering components are computed by summing up the contributions of the air molecules and the aerosols of various sizes and materials. An error function representation related to the visibility is used to estimate the absorption component for band absorption by water vapor. Illustrative calculations are carried out for representative conditions. The validity of the results appears to be limited by available information on the composition and the optical properties of the atmosphere rather than by the necessary mathematical approximations. (Author)

ENGINEERING

N64-10903
Airborne Instruments Lab., Deer Park, N. Y.
STUDY OF TOPSIDE SOUNDER FOR MARS AND VENUS IONOSPHERES FROM MARINER SPACECRAFT. Final rept.
T. Flattau and R. Donegan. Oct 63, 118p
Contract NASw-513
1844-1; NASA CR-52731
OTS $9.60

NASA-TN-D-1856
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
GROUND OPERATION EQUIPMENT FOR THE ORBITING ASTRONOMICAL OBSERVATORY
E. J. Habib, A. G. Ferris, H. W. Cooper, and R. L. McConaughy. Dec 63, 24p
N64-11622
OTS $0.75

PB-163 992
Minneapolis-Honeywell Regulator Co., St. Petersburg, Fla.
DIGITAL ANGLE ENCODER. Final rept., 25 Mar-30 Nov 60, on Development of an Incremental Encoder for an Inertial Platform in Unmanned Vehicles
V. O. Loveless and C. W. Wellner. 16 Jan 61, 62p
Contract AF33(616)7078
MH Aero rept. 61563-FR; WADD Technical rept. 61-88
OTS $6.60

DESCRIPTORS: *Analog to digital converters, *Gyro stabilizers, Gimbals, Velocity, Bearings, Servo motors, Torque, Errors, Hysteresis, Inertial guidance, *Extraterrestrial bases.

This report describes design goals and the development, fabrication, and testing of a miniature flyable breadboard model of a digital angle encoder for readout of gimbal angles. It discusses final testing procedures, results achieved, and conclusions drawn. (Author)

PB-165 025
Sperry Gyroscope Co., Great Neck, N. Y.
GYROTRON IA VIBRATORY RATE GYRO DEVELOPMENT PROGRAM. Final engineering rept.
May 54, 134p
Contract NOas-52-705-c
Sperry rept. no. 5231-3370; AD-40 494
OTS $10.50

DESCRIPTORS: *Gyroscopes, *Navigational aids, Design, Operation, Installation, Maintenance, Specifications, Momentum, *Tachometers, Tests

The Gyrotron IA Vibratory Rate Gyro has the same characteristics as previous models except that a ±50 degree-per-hour drift is allowable under the variable conditions of temperature and pressure normally encountered in service. Actually, the equipment is capable of operating over long periods of time with a drift of ±15 degrees per hour. Design data, in the form of test and performance specifications, have been prepared and are included. A complete set of manufacturing drawings has been furnished. The characteristics of the Gyrotron IA equipment were evaluated and compared with those of several typical rotary rate gyros.

N64-10140
TAPCO Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
BRAYTON CYCLE CAVITY RECEIVER DEVELOPMENT. Quarterly rept., Jul-Sep 63
1963, 36p
ER-5579; NASA CR-52390
OTS $3.60

Aeronautical Engineering

PB-163 990
[Aeronautical Systems Div., Air Force Systems Command] Wright-Patterson AFB, Ohio.
AERODYNAMICS, PERFORMANCE, AND DESIGN OF PERSONNEL GUIDE PARACHUTE
Helmut G. Heinrich. 21 Nov 51, 45p
Memo. rept. WCEE-672-145-A-9-1
OTS $4.60

DESCRIPTORS: *Parachutes, Control systems, Design.

The parachute canopy described in this report utilizes the interference drag between gores of different radial lengths as a source of additional drag and guide surfaces for stabilization. The Guide Parachute, Personnel, has the same rate of descent, bulk and weight as the standard 28 foot solid flat parachute; the stability is superior to any solid flat design; is reliable up to 400 mph bailout velocity; and has the lowest opening shock of all known man-carrying parachutes. Plotted courses of opening shock and opening time versus bailout velocity indicate the possibility of moderate opening shocks above 400 mph bailout velocity. Certain results indicate that utilization of the interference drag alone and in combination with the principle of guide surfaces may offer new possibilities in the design of cargo parachutes with low bulk, low opening shock and improved stability. (Author)

NASA-TN-D-2021
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LATERAL-SPREAD SONIC-BOOM GROUND-PRESSURE MEASUREMENTS FROM AIRPLANES AT ALTITUDES TO 75,000 FEET AND AT MACH NUMBERS TO 2.0
David A Hilton, Domenic J. Maglieri, William L. Copeland, and Tony L. Parrott. 63, 39p
N64-2021
OTS $1.00

N63-13873
Langley [Research Center, National Aeronautics and Space Administration, Langley Station] Va.
THE ORIGIN AND DISTRIBUTION OF SUPERSONIC STORE INTERFERENCE FROM MEASUREMENT OF INDIVIDUAL FORCES ON SEVERAL WING-FUSELAGE-SOTRE CONFIGURATIONS. III - SWEPT-WING FIGHTER-BOMBER CONFIGURATION WITH LARGE AND SMALL STORES. MACH NUMBER, 1.61
Norman F. Smith and Harry W. Carlson. 15 Sep 55, declassified 1 Apr 63. 115p
Research memo. RM L55H01
OTS $9.60

PB-165 026
Snell (Foster D.) Inc., New York.
RAIN REPELLENT. Final rept.
R. Blaufox, E. McDonnell, and J. Mitchell Fain.
20 Jan 61, 60p
Contract NOas 59-6046-c
AD-254 318
OTS $5.60

DESCRIPTORS: *Antirain agents, *Windshields, Aircraft, *Silanes, Alkyl radicals, Methyl radicals, Ethyl radicals, Sulfuric acid, Chemical reactions, *Moistureproofing

The effect of varying concentrations of sulfuric acid on dimethyldiethoxysilane was studied. Acidification of dimethyldiethoxysilane with acidic materials other than sulfuric acid was investigated as well as the acidification of alkylalkoxysilanes other than dimethyldiethoxysilane. A liquid repellent formulation 2911H-2157E has been developed which can be applied to the glass windshields of aircraft with a paper tissue, cloth, brush or by spray. It is applied easily in a one-step operation and has good rain spray life. The film after application will withstand temperatures of 300°F. minimum and is resistant to jet fuel. (Author) (See also AD-260 581)

Chemical Engineering

AD-288 916
Airesearch Mfg. Co., Los Angeles, Calif.
LOW TEMPERATURE ADSORPTION OF CARBON DIOXIDE. Final rept., 1 Sep 61-1 Mar 62
G. Christensen. Sep 62, 53p
Contract AF33(616)8323
Rept. no. SS-715R; ASD-TDR-62-560
OTS $5.60

DESCRIPTORS: *Spacecraft cabins, *Closed-cycle ecological systems, *Carbon dioxide, Adsorption, *Organolytes.

A test program was conducted to study low temperature adsorption of carbon dioxide by synthetic zeolites for possible application to space vehicle environmental control systems. Type 5A molecular sieves and a 1 mole per cent carbon dioxide concentration were used for most of the tests. The range of test conditions included temperatures from 530°R to 300°R, and process air superficial velocities from 30 fpm to 150 fpm. Presented in the report are the results of the tests which include (1) the effect of superficial velocity on adsorption, (2) the effect of bed length on adsorption, (3) the effect of low temperature on adsorption, (4) vacuum and thermal desorption of sieve adsorbed at low temperatures, and (5) miscellaneous data, such as pressure drop, temperature rise, and pellet size. The experimental results are extensively presented and include adsorption curves showing sieve load as a function of time, as well as curves of sieve capacity and adsorption efficiency. (Author)

IDO-14599
Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY. Quarterly progress rept. Jul-Sep 62.
J. R. Bower, ed. 28 Dec 62, 43p
Contract AT(10-1)205
OTS $1.00

IDO-14604
Phillips Petroleum Co., Idaho Falls.
EVALUATION OF THE METAL-TO-METAL CONTACT BASKET-TYPE ELECTROLYTIC DISSOLVER
H. T. Hahn, J. R. Aylward, and M. R. Bomar.
10 May 63, 39p
Contract AT(10-1)205
OTS $1.00

Electrical and Electronic Engineering

N64-11297
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
RESEARCH AND DEVELOPMENT OF AN OPEN-CYCLE FUEL CELL SYSTEM. Quarterly rept. no. 5, 1 Jul-30 Sep 63
J. Euclide, R. Opperthauser, C. Pax, D. Ghere, and B. Nichols. 31 Oct 63, 34p
Contract NAS8-2696
NASA-CR-52545
OTS $3.60

N64-11120
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
STUDY OF ENERGY CONVERSION SYSTEMS. Quarterly rept. no. 1, 1 May-31 Jul 63
R. Opperthauser, D. P. Ghere, and J. Euclide
30 Aug 63, 37p
Contract NAS8-5392
NASA-CR-52652
OTS $3.60

AD-293 201
Ampex Corp., Redwood City, Calif.
ELECTRICAL READOUT FOR WIDEBAND ELECTRON BEAM RECORDING. Final rept., Mar 61-Jun 62
K. F. Wallace, J. Herbert, and J. Voss. 27 Sep 62, 203p
Contract AF30(602)2474
RADC-TDR-62-394
OTS $14.00

DESCRIPTORS: *Recording systems, *Electronic recording systems, Broadband, *Electron beams, Secondary emission, *Display systems, Plastic film, *Camera tubes, Scanning,

Possible methods of obtaining wide bandwidth readout of thermoplastic recordings are discussed. Practical limitations encountered with flying spot scanners and Vidicon tubes are considered, and some laboratory measurements are presented. A detailed discussion is included of a secondary electron emission readout scheme which has fundamental limitations in excess of 100 megacycles. The detector scheme used is also described in detail, and the practical limitations encountered at present are outlined. Photographs of a feasibility model which was built in the laboratory and photographs of the readout scheme, which yields a 60-megacycle output, are included. The secondary emission readout scheme also lends itself to servo tracking, which is used to maintain the scanning beam in the correct position relative to the recording surface so that the recorded groove may be located easily. Results of experiments show that tracking with the electron beam is successful despite large errors which are introduced into the original recording. (Author)

PB-163 986
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
ELECTRONIC RECONNAISSANCE ANTENNAS. Final engineering rept., Vol. II, Part I
J. R. Copeland, W. J. Robertson, and C. H. Walter.
1 Dec 60, 26p
Contract AF33(616)6211
Rept. 903-16; AD-253 642
OTS $2.60

DESCRIPTORS: *Antennas, *Satellite antennas, *Spiral antennas, *Antenna amplifiers, *Parametric amplifiers, *Mixers (Electronic), Broadband, Tunnel diodes, Antenna radiation patterns, *Reconnaissance satellites

Approximate solutions were obtained for the farfield radiation patterns of the equiangular spiral antenna developed on planar, conical, and several other surfaces of revolution. The use of a hybrid circuit in a tunnel diode downconverter is shown to provide a stable broad-

band mixer with conversion gain and considerable local-oscillator suppression at its rf input terminals. Two types of antennaverters are described: (1) an integrated design of a conical spiral antenna and a crystal-diode mixer, and (2) the same spiral antenna but with a tunnel-diode downconverter for the active element. Two basic types of antennafiers are described: (1) the traveling-wave antenna with a traveling-wave amplifier, and (2) the broadband antenna with a distributed amplifier. (Author)

AD-266 196
Electrical Engineering Research Lab., Univ. of Texas, Austin.
AN OUTLINE OF BASIC EQUATIONS AND CONCEPTS OF PLASMA DYNAMICS
W. C. Duesterhoeft and B. M. Fannin. 30 Sep 61, 169p
Contract AF33(616)6257
Rept. no. 5-49
OTS $12.00

DESCRIPTORS: *Plasma physics, *Magnetohydrodynamics, *Equations, Fluid mechanics, Plasma oscillations, Electromagnetic waves, Electrostatic fields, Perturbation theory, Dielectrics, Energy, Wave transmission, Pressure, Magnetic effects, *Hydrodynamics, Electric currents, Tensor analysis, Vector analysis, Thermal conductivity, Magnetic pinch

The basic equations of plasma dynamics are developed from the fundamental laws of electrodynamics and hydrodynamics. Some of the approximate forms of these basic equations that are frequently encountered are presented, along with an indication of the physical significance of the approximations made and the more important conclusions or concepts derived from their study. This report is intended to give the novice in this field a concise, consistent presentation of the introductory concepts needed for more advanced work. Brief appendices covering the background topics of tensors, electromagnetic fields and hydrodynamics are also included. (Author)

N64-11809
Electro-Optical Systems, Inc., Pasadena, Calif.
HYDROGEN-OXYGEN ELECTROLYTIC REGENERATIVE FUEL CELLS
John J. Rowlette. 18 Oct 63, 49p
Contract NAS3-2781
EOS Rept. 4110-QL-1; NASA CR-55059
OTS $4.60

N64-10905
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SILVER ZINC BATTERIES POWER SUPPLY FOR THE ATMOSPHERE STRUCTURE SATELLITE EXPLORER XVII
P. C. Donnelly and C. F. Palandati. Oct 63, 20p
Technical memo X-51150; X-636-63-206
OTS $1.60

PB-163 958
Hughes Aircraft Co. [Newport Beach] Calif.
HIGH-FREQUENCY SILICON TRANSISTOR. Final rept., Volume I, 28 Jun 56-29 Apr 60
R. Elvig and S. H. Yancey. [1960] 237p
Contract DA36-039-sc-72702
AD-242 372
OTS $15.50

DESCRIPTORS: *Transistors, Silicon, High frequency, Materials, Production, Semiconductors, *Manufacturing methods, Tests, Specifications,

Special machinery has been developed and built to perform operations unique in the manufacture of semiconductor devices. Manufacturing techniques, new to the contractor, were developed especially in the areas of solid state diffusion, photo-masking, and thermo-compression bonding. State-of-the-art samples were produced and delivered as required. Qualification samples and test data were submitted and approval was obtained to proceed with the pilot run. The pilot run was completed and the devices with the acceptance test samples and test data have been accepted and shipped. An Industrial Preparedness Study has been submitted for the production of 600,000 units of each device per month. (Author) (See also AD-225 297)

PB-163 989
Illinois Univ., Urbana.
ABSTRACTS OF THE ANNUAL SYMPOSIUM ON THE USAF ANTENNA RESEARCH AND DEVELOPMENT PROGRAM (11th) HELD AT ROBERT ALLERTON PARK, MONITICELLO, ILLINOIS 16-20 OCTOBER 1961; SPONSORED BY AERONAUTICAL SYSTEMS DIVISION, WRIGHT PATTERSON AIR FORCE BASE, OHIO, VOLUME I. [1961] 400p
OTS $21.00

DESCRIPTORS: *Antennas, *Conferences, *Abstracts, *Air force research, Satellite antennas, Microwave equipment, Circuits, Spiral antennas, Direction finding, Tracking, Scanning, *Antenna radiation patterns, Antenna configurations.

Contents:
Space antennas
Microwave antenna circuitry
Direction finding and location techniques
Scanning techniques
Environmental design parameters

N64-11742
Lear Siegler, Inc., Cleveland, Ohio.
BRUSHLESS ROTATING ELECTRICAL GENERATORS FOR SPACE AUXILIARY POWER SYSTEMS. Quarterly rept. no. 1, 31 Oct 63
J. N. Ellis and F. A. Collins. [1963] 155p
Contract NAS3-2783
NASA CR-52916
OTS $11.50

N64-10901
Livingston Electronic Corp., Montgomeryville, Pa.
DEVELOPMENT OF HIGH ENERGY DENSITY PRIMARY BATTERIES, 200 WATT HOURS PER POUND OF TOTAL BATTERY WEIGHT MINIMUM. Quarterly rept. no. 1, 21 May-19 Aug 63
W. F. Meyers, G. M. Armstrong, W. G. Hagenbuch W. C. Merz, and D. W. Klopp. 28 Oct 63, 82p
Contract NAS3-2775
NASA CR-52550
OTS $8.10

N64-11099
Monsanto Research Corp., Everett, Mass.
DEVELOPMENT AND FEASIBILITY PROOF OF THE DRY TAPE BATTERY CONCEPT. Quarterly rept., no. 1, 14 Jun-30 Sep 63
Bernard A. Gruber, Alexander A. Borsanyi, R Ralph Kafesjian, and John O. Smith. 31 Oct 63, 38p
Contract NAS3-2777.
MRC report no. MRB5001Q1; NASA CR-52712
OTS $3.60

PB-163 975
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Interim summary rept. covering item no. 1, 1 Mar 57-30 Jun 58
Stanley Grand and Alexander Kraus. [1958] 118p
Contract DA36-039-sc-73203
OTS $9.60

DESCRIPTORS: *Dielectric films, *Capacitors, Films, *Subminiature electrical equipment, *Manufacturing methods, Polymerization, Glow discharges, Styrenes, Gases, Methyl radicals, Silanes, Feasibility studies

The glow-discharge polymerization process was first studied using styrene gas as the starting material. Subsequent experiments with a wide variety of promising organic and inorganic monomers showed that polymerization and film deposition could be achieved with many materials to yield dielectric films having a wide range of properties. In order to evaluate properly the Teflon films prepared under various glow discharge conditions, an experimental capacitor construction technique was developed. A total of more than one hundred runs was performed in which Teflon films were deposited on 1/4 mil aluminized Mylar substrates. Most of the unmetalized Teflon films prepared exhibited power factors below .0025. Metalization and fabrication into capacitors usually resulted in an increase in power factor due to the addition of the series resistance of the evaporated electrodes and to the inclusion of the Mylar substrate. Completed experimental models were life-tested for long periods at 85°C and 45 VDC. These results show that excellent Teflon dielectric films are produced by the glow discharge process.

PB-163 977
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly progress rept. no. 2, 1 Jun-1 Sep 57,
Jerome Goodman [1957] 30p
Contract DA36-039-sc-73203, continuation of contract DA36-039-SC-70117
AD-148 354
OTS $2.60

DESCRIPTORS: *Dielectric films, *Capacitors, Design, Construction, Subminiature electrical equipment, Electrical properties, Feasibility studies, Guided missiles.

Fourteen different chemical compounds were used to make films, with varying results. The best results were obtained with teflon and silicone films. Other materials such as silicon tetrafluoride were found promising but were somewhat more difficult to prepare due to high ionization voltages. Infra red data were obtained for some thin film dielectrics. Capacitors employing evaporated aluminum electrodes and a 1/4 mil mylar base were constructed, and gave results, with mercury contact to the aluminum electrode, which suggest that technical requirements for capacitors over .1 mfd can be met. Investigation was started of methods for making electrode contact which would be suitable for use in rolled units, and a simple winding machine was constructed. (Author)

PB-163 978
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly rept. no. 3, 1 Sep-1 Dec 57
Stanley Grand. [1957] 32p
Contract DA36-039-sc-73203
AD-160 421
OTS $3.60

DESCRIPTORS: *Dielectric films, *Capacitors, Metal plates, Electrodes, Electrodeposition, Silicone plastics, Feasibility studies, Subminiature electrical equipment, Guided missiles.

Metal-plate electrodes were used to study the deposition of silicone films as a function of the charge transported. Initially, the film thickness increases linearly with charge, but at higher thicknesses the deposition rate is slower. A three-electrode system was designed and tested. It is hoped that sparking can be eliminated by isolating the high voltage required to produce the gas discharge from the deposited dielectric film. Also, a R. F. system has been tested and appears to eliminate sparking and produces a stable, homogeneous discharge. A static system was used to produce films on aluminized Mylar foil up to 12 inches in length. After deposition of an upper Al electrode, flat capacitors with capacities greater than 0.1 MFD were obtained. A continuous production system has been designed and partially constructed. When the formation parameters now under investigation have been established, a considerable quantity of film can be produced with this system. A program to study lead attachment and other fabrication problems was outlined. (Author) (See also PB-163 977)

PB-163 976
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly rept. no. 4, 1 Jul-30 Sep 58
Stanley Grand, Alexander Kraus, and Morton Schiff. [1958] 31p
Contract DA36-039-sc-73203
OTS $3.60

DESCRIPTORS: *Dielectric films, *Capacitors, Films, *Subminiature electrical equipment, *Manufacturing methods, Polymerization, Vacuum apparatus, Electrical properties, Tests.

A laboratory scale continuous polymerizer is under construction. In addition to the vacuum system, a simple oven and a motor-driven roller assembly have been desgined and are being fabricated. A pressure-controlling system will be incorporated into the vacuum system. Equipment for winding and lead attachment is also under construction. Additional tests have been performed on several of the Teflon film capacitors previously prepared, during the first portion of the contract. Tests at 125°C and 73 VDC indicate that a Teflon thickness of 1.5 microns will be required. (Author) (See also PB 163 975)

PB-163 979
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly rept. no. 5, 1 Oct-31 Dec 58
Stanley Grand, Alexander Kraus, Morton Schiff, and Bernard Caras. [1959] 38p
Contract DA36-039-sc-73203
OTS $3.60

DESCRIPTORS: *Dielectric films, *Capacitors, Films, *Subminiature electrical equipment, *Manufacturing methods, Polymerization, Vacuum apparatus, Electric discharges, Electrical properties, Tests.

Construction of the continuous polymerizer was completed. A calibrated pressure gauge allows accurate pressure measurements and a manostat maintains the system at constant pressure. A pair of metal backing plates was added to the tape transport system thereby overcoming several difficulties which arose in early experiments. Several runs have been performed in the continuous polymerizer yielding films 3-7 feet long. The Metco metal spray equipment was put into operation. A special exhaust hood was designed and constructed for use with the spray gun. It was found that the rate of deposition of the polymer film can be increased appreciably by increasing the current density in the discharge and by maintaining the most efficient monomer composition during the run. Films 1.5 microns thick have been deposited in less than 5 minutes. Measurement of the breakdown voltage of Teflon monomer discharges show that the voltage required decreased markedly at megacycle frequencies. (Author) (See also PB-163 976)

PB-163 980
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly rept. no. 6, 1 Jan-31 Mar 59
Stanley Grand, Alexander Kraus, Morton Schiff, and Bernard Caras. [1959] 35p
Contract DA36-039-sc-73203
OTS $3.60

DESCRIPTORS: *Dielectric films, *Capacitors, Films, *Subminiature electrical equipment, *Manufacturing methods, Polymerization, Aluminum coatings, Gases, Feasibility studies,

A number of Teflon films were prepared in the continuous polymerization system. Many of these films were used to fabricate experimental capacitors. It appears that an evaporated aluminum layer in intimate contract with the Teflon will be necessary. A mass spectrometric study of the gas mixture in the polymerizer indicates that only low molecular weight species are consumed during polymerization. (Author) (See also PB 163 979)

PB-163 981
Radiation Research Corp., New York.
FILM DIELECTRIC CAPACITORS. Quarterly rept. no. 7, 1 Apr-30 Jun 59
Stanley Grand, Bernard Caras, and Alexander Kraus. [1959] 30l
Contract DA36-039-sc-73203
AD-220 730
OTS $2.60

DESCRIPTORS: *Dielectric films, *Capacitors, *Subminiature electrical equipment, *Manufacturing methods, Polymerization, Films, Aluminum coatings, Feasibility studies.

An extensive study of aluminized Teflon films showed that the resistivity of these films is proportional to their thickness. The continuous polymerizer and the aluminizer were improved to provide long length of film for the construction of experimental capacitors using one micron Teflon layers. (Author) (See also PB-163 980)

SC-DR-260-63
Sandia Corp., Albuquerque, N. Mex.
DC POWER SUPPLY FOR FERROELECTRIC LOOP GENERATION. Development rept.
J. W. Wentz and C. W. Boots. Nov 63, 14p
Contract [AT(29-1)789]
OTS $0.50

PB-163 985
Texas Instruments, Inc., Dallas.
RESEARCH AND DEVELOPMENT OF ELECTRICAL CONNECTION TECHNIQUES FOR FUNCTIONAL ELECTRONIC BLOCKS. Interim engineering rept. no. 4, 1 Jan-31 Mar 62; Final rept., 1 Apr 61-31 Mar 62
J. E. Varga. 15 Jul 62, 53p
Contract AF33(616)8133
Rept. no. 02-62-28
OTS $5.60

DESCRIPTORS: *Packaged circuits, *Printed circuits, *Encapsulation, *Embedding substances, *Coatings, *Electric insulation, *Protective coverings, *Electric connectors, Ceramic materials, Oxides, Thin films, Silicon compounds, Glass, Epoxy plastics

This program began with investigations of various materials for embedding and interconnecting functional electronic blocks (FEB's). These included substrates, coating materials (for isolation of components, electrical insulation, and protective covering), and conducting materials for deposition of electrical interconnecting leads. After the most promising materials were selected, techniques and processes for using them were determined. Materials were chosen which were compatible, electrically and physically, throughout the constructing and processing stages, and in the final products. These materials and processes did not change the electrical characteristics of the devices. Modules (test vehicles) of increasing complexity were developed to test and prove compatibility of materials and processes. Because of the brevity of the contract period, extensive reliability data is not yet available, but the outlook is very godd. One of the most attractive achievements of this program is the attainment of component densitites in the demonstration modules of 4×10^7 per cubic foot. (Author)

AD-290 323
Texas Instruments, Inc., Dallas.
THIN FILMS FORMED BY ELECTROCHEMICAL REACTIONS. Quarterly progress rept. no. 1, 1 Jun-31 Aug 63
Wayne E. Patterson and Charles L. White. Nov 62, 51p
Contract DA36-039-sc-90745
OTS $5.60

DESCRIPTORS: *Printed circuits, *Microminiaturization (Electronics), *Capacitors, *Resistors, *Radio-frequency filters, *Thin films, Metal films, *Tantalum, *Niobium, *Sputtering,

A pattern suitable for studying properties of tantalum and niobium films as well as their anodic oxide films has been designed, and the appropriate masks are being fabricated. Improved handling methods associated with a pilot production facility of tantalum film circuits have resulted in increased yields. An anodizing stop-off material which yields improved breakdown characteristics has been determined. Electrical evaluation of sputtered tantalum has shown that a "pre-use" sampling evaluation is necessary to predict anodizing characteristics of a given lot. Coated tantalum film resistors show low average temperature coefficients for low ohmic values, and higher ohmic values exhibit average temperature coefficients tending to be negative. At 125°C, coating of tantalum film resistors causes a reduction in power dissipating capabilities. Both tantalum and niobium films show very low excess noise levels characteristic of metal films. On the backside of an alumina substrate, three 10 kilohm tantalum film resistors gave a hotspot temperature of 51°C for 175 milliwatt loading at 25°C ambient. Surface condition of the cathode has been found to be a critical factor in sputtering. (Author)

N64-10442
Union Carbide Corp., Parma, Ohio.
STUDY PROGRAM TO IMPROVE FUEL CELL PERFORMANCE BY PULSING TECHNIQUES. Quarterly rept. no. 1, 1 Jul-30 Sep 63
M. L. Kronenberg. 1 Oct 63, 21p
Contract NAS3-2752
NASA CR-52490
OTS $2.60

Mechanical Engineering

NASA-TN-D-2077
Minnesota Univ., Minneapolis.
HEAT TRANSFER FROM FIN-TUBE RADIATORS INCLUDING LONGITUDINAL HEAT CONDUCTION AND RADIANT INTERCHANGE BETWEEN LONGITUDINALLY NONISOTHERMAL FINITE SURFACES
E. M. Sparrow, V. K. Jonsson, and W. J. Minkowycz, Dec 63, 27p
N64-11193
OTS $0.75

PB-181 585
Pope, Evans, and Robbins, New York.
COAL-FIRED HEATING PLANT PACKAGE, PHASE II REPORT
Michael Pope. Nov 63, 78p
Contract OCR14-01-0001-242
OTS $2.00

DESCRIPTORS: *Heating plants, Automatic, *Boilers, Design, Coal, Storage, Containers,

Drawings and specifications are presented of a coal-fired boiler plant. Complete specifications and drawing indices are included with each specification. One version of the plant provides for below-ground coal storage, and another for above-ground storage where deep excavation is not possible. (See also PB-181 586, PB-181 587)

PB-181 586
Pope, Evans, and Robbins [New York.]
PACKAGE COAL-FIRED BOILERPLANT 100,000 LBS. PER HR. CAPACITY BELOW GROUND COAL STORAGE VERSION. [1963] 1v.
[Contract OCR14-01-0001-242]
Specification no. OCR-100
OTS $7.00

DESCRIPTORS: *Heating plants, Automatic, *Boilers, Design, Coal, Storage, Containers,

Specifications are given for a two boiler coal-fired heating plant and auxiliary equipment and structures. Coal storage is in the form of two 200 ton coal tanks, with a system for automatically transferring coal to the stokers and removing ashes to an ash silo. The plant is designed to operate automatically with intermittent attendance by one operator.

PB-181 587
Pope, Evans, and Robbins [New York]
PACKAGE COAL-FIRED BOILERPLANT 100,000 LBS. PER HR. CAPACITY ABOVE GROUND COAL STORAGE VERSION. [1963] 1v.
[Contract OCR14-01-0001-242]
Specification no. OCR-100A
OTS $7.00

DESCRIPTORS: *Heating plants, Automatic, *Boilers, Design, Coal, Storage, Containers,

Specifications are given for a two boiler coal-fired heating plant and auxiliary equipment and structures. Coal storage is in the form of a combination coal and ash storage silo with a capacity of approximately 410 tons of coal and 30 tons of ash. Coal transfer to stoker hoppers and ash removal to silo ash compartment is automatic. The plant is designed to operate automatically with intermittent attendance by one operator. (See also PB-181 586)

Y-1449
Union Carbide Nuclear Co., Oak Ridge, Tenn.
PRESSURE INTENSIFICATION PROVIDED BY EXTERNAL PRESSURE ON A CYLINDER COMPOSED OF FOUR ANVILS
R. L. Huddleston. 10 Jun 63, 117p
Contract W7405-eng-26
OTS $2.25

N64-10907
Aeronutronic, Newport Beach, Calif.
THE EMPIRE DUAL PLANET FLYBY MISSION
Franklin P. Dixon. [1963] 46p
Contract NAS8-5025
NASA-CR-52677
OTS $4.60

NASA-TN-D-2068
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SIMULATOR STUDIES OF THE MANUAL CONTROL OF VEHICLE ATTITUDE USING AN ON-OFF REACTION CONTROL SYSTEM
Armando E. Lopez and Donald W. Smith. Dec 63, 27p
N64-11246
OTS $0.75

N64-10141
Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS NO. C-34
Beatrice Miller. 17 Jul 63, 54p
Grant NsG-87-60
Special rept. no. 130; NASA CR-52454
OTS $5.60

PB-163 952
[Bureau of Naval Weapons, Washington, D. C.]
PILOTLESS AIRCRAFT. Bimonthly status rept.
1 Sep 46, declassified 16 Sep 63, 177p
[Contract NOas-8276]
Available on loan from OTS

DESCRIPTORS: *Drones, Launching, *Guided missiles, *Target drones, Electronic equipment, Guidance, Power supplies, Armament, Catapults,

Progress is reported on air launched projects; ship launched projects; experimental projects; drones and targets; electronics projects; ships installation projects; power plant projects; and armament projects.

PB-163 953
[Bureau of Naval Weapons, Washington, D. C.]
PILOTLESS AIRCRAFT. Bimonthly status rept. Dec 46, declassified 16 Sep 63, 188p
[Contract NOas-8276]
Available on loan from OTS

DESCRIPTORS: *Drones, Launching, *Guided missiles, *Target drones, Electronic equipment, Guidance, Propellants, Catapults, Power supplies, Armament.

A report is given on the Navy model designation system for pilotless aircraft. Progress is reported on air launched projects; ship launched projects; experimental projects; drones and targets; electronics projects; ships installation projects; power plant projects; armament projects. (See also PB-163 952)

PB-163 954
[Bureau of Naval Weapons, Washington, D. C.]
PILOTLESS AIRCRAFT. Bimonthly status rept.
1 Mar 47, declassified 16 Sep 63, 126p
[Contract NOas-8276]
Available on loan from OTS

DESCRIPTORS: *Drones, Launching, *Guided missiles, *Target drones, Electronic equipment, Guidance, Stabilization systems, Catapults, Power supplies, Armament,

A report is given on the U.S. Naval Air Missile Test Center; Bureau of Aeronautics Research and Development Symposium; Navy Guidance and Control Symposium. Progress is reported on air launched projects; ship launched projects; experimental projects; drones and targets; electronics projects; ships installation projects; power plant projects; and armament projects. (See also PB-163 953)

N64-11816
Exotech Inc., Alexandria, Va.
ATTITUDE CONTROLS FOR SUN-ORIENTED SPACE STATIONS.
Summary rept.
William C. Cooley, Samuel Schalkowsky, and Terrel Marshall, Jr. Nov 63, 49p
Contract NASw-720
Rept. TR-006; NASA CR-55033
OTS $4.60

N63-22586
Hughes Aircraft Co., Culver City, Calif.
SOLAR ELECTRIC PROPELLED SPACECRAFT, CAPABILITIES STUDY. Final rept. Jun 63, 111p
Contract NASw-560
SSD-3328R; NASA CR-5156
OTS $9.60

N63-21980
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1956-66, VOLUME 2, PART A
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 15 Apr 63, 790p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-51227
OTS $31.00

N64-10310
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1968-69
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 1 Aug 63, 791p
Contract NAS7-100
Technical memo no. 33-99, vol. 4, pt. A; NASA CR-52465
OTS $31.00

N64-10099
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1968-69, VOLUME 4, PART B
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 15 Aug 63, 789p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-52268
OTS $31.00

N64-10100
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1968-69, VOLUME 4, PART C
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 3 Sep 63, 790p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-52142
OTS $31.00

NASA-TN-D-2016
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ANALYTICAL STUDY OF LUNAR LANDING TRAJECTORIES WITH REFERENCE TO THE LUNAR-ORBIT-RENDEZVOUS MODE AND POSSIBLE ABORT SITUATIONS
James L. Williams and L. Keith Barker. Dec 63, 32p
N64-11551
OTS $0.75

NASA-TN-D-2044
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FREE-FLIGHT INVESTIGATION OF THE DEPLOYMENT OF A PARAWING RECOVERY DEVICE FOR A RADIO-CONTROLLED 1/5-SCALE DYNAMIC MODEL SPACECRAFT
Charles E. Libbey, Dec 63, 23p
N64-11236
OTS $0.75

NASA-TN-D-2046
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
JET EFFECTS AT SUPERSONIC SPEEDS ON BASE AND AFTERBODY PRESSURES OF A MISSILE MODEL HAVING SINGLE AND MULTIPLE JETS
Nickolai Charczenko and Clyde Hayes, Nov 63, 42p
N64-10520
OTS $1.00

N64-10106
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
STABILITY CONSIDERATIONS OF A SPACE VEHICLE IN BENDING OSCILLATIONS FOR VARIOUS CONTROL SENSORS
Robert S. Ryan. 20 Aug 62, 25p
MTP-AERO-62-65; NASA TM-X-51081
OTS $2.60

N64-11102
Space Technology Labs., Inc., Redondo Beach, Calif.
ATLAS/CENTAUR PROGRESS REPORT, 30 SEPTEMBER THROUGH 11 OCTOBER 1963
T. W. Layton. [1963] 10p
Contract NAS3-3231
8414-6108-RU-000; NASA CR-52697
OTS $1.10

Safety Engineering

TID-5360 (Suppl. 4)
Atomic Energy Commission, Washington, D. C., Div. of Operational Safety.
A SUMMARY OF INDUSTRIAL ACCIDENTS IN USAEC FACILITIES 1961-1962. Dec 63, 38p
OTS $0.75

WT-1723
Holmes and Narver, Inc., Los Angeles, Calif.
RADIATION SHIELDING AND RESPONSE STUDIES OF AEC STRUCTURES. Rept. on Operation Hardtack, Apr-Oct 58.
R. A. Cameron, Jr., and P. H. Huff. Jun 62, 57p
OTS $1.25

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines

N64-11438
Aerojet-General Corp., Sacramento, Calif.
STUDY OF HIGH EFFECTIVE AREA RATIO NOZZLES FOR SPACECRAFT ENGINES. Interim rept. 18 Apr 62-18 Apr 63
L. H. Paynter. 16 Sep 63, 432p
Contract NAS7-136, phase I
NAS7-136-01F; NASA CR-52870
OTS $22.25

TID-16050
Laboratories for Applied Sciences, Univ. of Chicago, Ill.
APPLICATIONS OF RADIOISOTOPES TO MEASUREMENTS OF PISTON RING WEAR AND EVALUATIONS OF ENGINE OILS. I. EXPERIMENTS WITH COBALT-60. II. LITERATURE SURVEY. Final rept.
J. E. Brugger, F. F. Rieke, and R. A. Semmler.
Contract AT(11-1)712
OTS $3.50

NASA-TN-D-2076
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EXPERIMENTAL INVESTIGATION OF A 4.54-INCH-MEAN-DIAMETER THREE-STAGE REVERSE-FLOW REENTRY TURBINE
Donald E. Holeski and William T. Wintucky, Nov 63, 27p
N64-10184
OTS $0.75

Machine Parts

NASA-TN-D-2101
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
HIGH SPEED VACUUM PERFORMANCE OF GOLD PLATED MINIATURE BALL BEARINGS WITH VARIOUS RETAINER MATERIALS AND CONFIGURATIONS
Harold E. Evans and Thomas W. Flatley, Dec 63, 21p
N64-11237
OTS $0.75

Propulsion Systems

N64-10624
Jet Propulsion Lab., Calif Inst. of Tech., Pasadena.
PUBLICATIONS OF THE JET PROPULSION LABORATORY, JULY 1962 THROUGH JUNE 1963
Suzanne Kresser, comp. 30 Aug 63, 77p
Contract NAS7-100
Bibliography no. 39-4; NASA CR-52527
OTS $7.60

NASA-TN-D-2080
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
COMPILATION OF THEORETICAL ROCKET PERFORMANCE FOR THE CHEMICALLY FROZEN EXPANSION OF HYDROGEN
Ernie W. Spisz. Dec 63, 28p
N64-11904
OTS $0.75

N64-10623
Rocketdyne, Canoga Park, Calif.
PROPULSION REQUIREMENTS FOR SOFT LANDING IN EXTRATERRESTRIAL ENVIRONMENTS. VOLUME I - SUMMARY AND PROPULSION DESIGN GUIDE. Final rept.
M. S. Bensky. Feb 63, 140p
Contract NAS7-124
R-5061; NASA CR-52486
OTS $10.50

MATERIALS

N64-11420
IIT Research Inst., Chicago, Ill.
PROTECTIVE COATINGS FOR REFRACTORY METALS IN ROCKET ENGINES. Summary rept., 9 Mar 62-8 Mar 63 1 Oct 63, 97p
Contract NAS7-113
IITRI-B237-12; NASA CR-52871
OTS $8.60

PB-163 951
Illinois Univ., Urbana.
RESEARCH ON ELEVATED TEMPERATURE RESISTANT CERAMIC STRUCTURAL ADHESIVES. Rept. for Mar 59-Feb 60, on Non-Metallic and Composite Materials
Gene H. Haertling, Kanaiyalal N. Parikh, N. Richard Thornton, Henry G. Lefort, and Julian H. Lauchner. Jun 60, 102p
Contract AF33(616)6192
WADC Technical rept. 55-491, Part V; AD-243 915-L
OTS $9.10

DESCRIPTORS: Ceramic materials, *Adhesives, Crystal structure, High temperature research, Physical properties, Mechanical properties,

Glassy bond and air setting adhesives were developed and studied. High temperature (to 2000°F) strength, ductility and moisture resistance were targets. Methods of attack included metal and metal oxide powder additions, crystallization of gold nucleated bonding glasses, study of metal surface roughness function and evaluation of stress-strain relations in metal-adhesive composites. In a study of moisture resistance, additions of about 33% of Fe_3O_4 were made to selected air setting or low temperature curing adhesives. Tensile shear values of the order of 1350 psi at room temperature and 1150 psi at 800°F were obtained but the adhesives disintegrated after a 3 1/2 hour boiling water treatment. When duplicate specimens were given a preliminary heat treatment of one hour at 1000°F, shear strengths were reduced by about 50%, but they were essentially unchanged by the 3 1/2 hour boiling water treatment. In glassy bond adhesives, stainless steel and phosphatized carbonyl iron powder additions gave improved strength, still increasing at 1000°F. Crystallized bonds gave higher strengths at the higher test temperatures. An optimum metal surface roughness value was noted. High order residual stresses (desirable to remove) were found in some metal-glassy gond composites. (Author)

NASA-TN-D-2024
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE EFFECT OF RESIN COMPOSITION AND FILLERS ON THE PERFORMANCE OF A MOLDED CHARRING ABLATOR
Roger W. Peters and Kenneth L. Wadlin, Dec 63, 39p
N64-11553
OTS $1.00

N63-14765
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN EXPERIMENTAL INVESTIGATION OF ABLATING MATERIALS AT LOW AND HIGH ENTHALPY POTENTIALS
Bernard Rashis and Thomas E. Walton, Jr. Mar 60, declassified 12 Mar 63, 37p
Technical memo. X-263
OTS $3.60

Ceramics

NASA-TN-D-2082
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AN EXAMINATION OF THE ROLLING-CONTACT FATIGUE PROCESS IN A CRYSTALLIZED-GLASS CERAMIC
Shelley Harrell and Erwin V. Zaretsky, Dec 63, 17p
N64-11557
OTS $0.50

Refractories

N64-10339
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MECHANICAL AND THERMAL PROPERTIES OF HOT-PRESSED ZIRCONIUM CARBIDE TESTED TO 2600°C
Martin H. Leipold and Thomas H. Nielsen. 15 Sep 63, 19p
Contract NAS7-100
Technical report no. 32-452; NASA CR-52455
OTS $1.60

Fuels

NASA-TN-D-2079
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF A CONFINED FLUID SUBJECTED TO NONUNIFORM SOURCE AND WALL HEATING
Bernhard H. Anderson and Michael J. Kolar, Nov 63, 42p
N64-10467
OTS $1.00

NASA-TN-D-1991
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AN EXPERIMENTAL INVESTIGATION OF THE VISCOUS DAMPING OF LIQUID SLOSHING IN SPHERICAL TANKS
Irving E. Sumner and Andrew J. Stofan. Dec 63, 31p
N64-11235
OTS $0.75

NASA-TN-D-2074
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AN INTEGRATED HOT WIRE-STILLWELL LIQUID LEVEL SENSOR SYSTEM FOR LIQUID HYDROGEN AND OTHER CRYOGENIC FLUIDS
William A. Olsen, Jr. Nov 63, 33p
N64-10466
OTS $1.00

AD-290 395
Shell Oil Co., New York.
COMBUSTION CHARACTERISTICS OF SPECIAL HYDROCARBON JET FUELS. Final rept., Dec 60-Feb 62, on Aviation Fuels
W. W. Horstman and J. L. Jackson. Jul 62, 93p
Contract AF33(616)8059
ASD-TDR-62-682
OTS $8.60

DESCRIPTORS: *Aviation fuels, *Jet engine fuels, Hydrocarbons, *Combustion, Tests, Combustion chambers, Heat transfer

A single combustor from a General Electric J-79 engine was used to evaluate combustion efficiency, flame radiation, fuel consumption, and altitude relight characteristics of twelve hydrocarbon fuels. Selection of fuels was based primarily on heat of combustion, density, Luminometer Number, and thermal stability for potential use in supersonic aircraft gas turbine engines. Tests were made with simulated Mach 1.5, 2, 2.5, and 3 speeds at 80,000 feet altitude, and a higher combustor severity condition at the maximum compressor output. The relative combustion efficienty was approximately constant for all fuels at a given test condition but increased about 9% as the combustion intensity was increased from 82,000 to 295,000 Btu/cu ft/min. An inverse linear relationship existed between fuel heat of combustion and fuel consumption at a constant burner temperature rise. The fuel consumption also correlated with fuel composition. Combustor metal temperature was directly proportional to the combined effect of heat conduction and convection and flame radiation. Ease of relight at simulated altitude conditions increased with decreasing ASTM 10% distillation temperature and with increasing paraffin content of the fuel. (Author)

PB-163 957
[Texaco Experiment] Inc., Richmond, Va.
SOME SAFETY IN HANDLING CHARACTERISTICS OF A MIXTURE OF 70% PROPYNE AND 30% ALLENE
Lloyd E. Line, Jr. 14 Jul 59, 17p
Contract NOrd-15689
Rept. no. EXP 159; TM-1104; AD-230 427
OTS $1.60

DESCRIPTORS: *Fuels, *Propellants, *Acetylene derivatives, *Allenes, *Propynes, Nitrogen, Handling, *Fire safety, *Autoignition, Ignition, Detonation,

In five self-decomposition tests, a mixture of 70% propyne and 30% allene was shown to be equivalent to pure propyne. It was considered reasonable to assume that the mixture could be handled safely in the same manner as propyne. (Author)

Lubricants

NASA-TN-D-2081
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EVAPORATION RATES FOR VARIOUS ORGANIC LIQUID AND SOLID LUBRICANTS IN VACUUM TO 10^{-8} MILLIMETER OF MERCURY AT 55° TO 1100°F
Donald H. Buckley and Robert L. Johnson. Dec 63, 28p
N64-11992
OTS $0.75

Plastics

AD-277 957
Aerojet-General Corp., Azusa, Calif.
CRITERIA FOR PLASTIC ABLATION MATERIALS AS FUNCTIONS OF ENVIRONMENTAL PARAMETERS. PART I. RESULTS OF ANALYTICAL STUDIES.
Interim rept., Jun 60-Jul 61, on Materials Application
B. McFarland, P. Joerg, and M. Taft. May 62, 106p
Contract AF33(616)7401
ASD-TR-61-439, Part I; N62-13949
OTS $9.10

DESCRIPTORS: *Heat shields, *Ablation, Plastics, *Laminated plastics, *Phenolic plastics, *Asbestos, *Nylon, *Amino plastics, *Melamine, *Glass textiles, Test methods,

A mathematical model for the ablation of heterogeneous materials is developed and compared with experimental data for phenolic-asbestos, phenolic-nylon, phenolic-Refrasil and melamine-glass cloth laminates. Good agreement between theory and experiment was obtained for both transient and steady-state data. The pertinent physical parameters are discussed in terms of their influence on insulation requirements, and general requirements for an optimum insulation system are developed. Error analyses are presented to evaluate the effects of body geometry, variable ablation rate, and conductive substrates on heat penetration into the unchanged plastic. (Author)

AD-287 215
General Electric Co., Bridgeport, Conn.
REINFORCED PLASTIC MAGNETIC TAPE. Quarterly rept. no. 2, 1 Jun-31 Aug 62
D. W. Fox, D. E. McBournie, and R. W. Finholt.
[1962] 37p
Contract DA36-039-sc-88951
OTS $3.60

DESCRIPTORS: *Magnetic tape, *Plastics, Glass textiles, *Data storage systems, Magnetic recording systems, Carbonates, Silicones, Nitriles, Coatings,

Magnetic tape base materials possess inadequacies in certain critical data storage applications. The objective of this project is to develop backing materials which will improve the efficiency and reliability of automatic data processing equipment and astro-electronic recording devices. The second quarter proved that smooth, uniform magnetic coatings could be applied to polycarbonate-filled glass cloth. Progress: (1) Mixed solvents improve the coating technique. (2) Use of a nitrile-silicone as a glass sizing improves moisture resistance. (3) A transfer method avoids solvent attack on the base. Many of the tape requirements can now be met. (Author)

PB-165 023
Resin Research Labs., Inc., Newark, N. J.
STEREOSPECIFIC THERMOSETTING RESINS AND HIGH HEAT RESISTANT ADHESIVES. Final rept., 1 Aug 58-31 Jul 59 6 Oct 59, 165p
Contract NOas 58-870-c
Rept. no. 740; AD-234 630
OTS $8.60

DESCRIPTORS: *Laminates, *Adhesives, *Resin adhesives, *Heat-resistant plastics, *Thermosetting plastics, *Styrene plastics, *Phenolic plastics, Polymerization, Colloids, Metallic soaps, *Chelate compounds.

Attempts to prepare space-oriented polymers by the use of large quantities of micelle-forming materials in a free radical-type polymerization have been unsuccessful. Anionic, nonionic and cationic micellar materials were used. The use of chelate compounds as a component of thermosetting resins has led to the production of laminates possessing good mechanical and thermal stability at elevated temperatures. Further work in this area is necessitated to determine specifically the beneficial effect of chelation as regards strength retention at elevated temperature. (See also PB-148 388)

MATHEMATICS

N64-11811
Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
FORMULAE AND TABLES FOR THE COMPUTATION OF LIFETIMES OF ARTIFICIAL SATELLITES
Luigi G. Jacchia and Jack Slowey. 16 Sep 63, 26p
Grant NsG-87-60
SAO special rept. 135; NASA CR-55058
OTS $2.60

WAPD-TM-391
Bettis Atomic Power Lab., Pittsburgh, Pa.
AN ALTERNATING DIRECTION METHOD FOR OPERATORS WITH AN APPLICATION TO THE TRANSPORT EQUATION
R. B. Kellogg. Oct 63, 43p
Contract AT(11-1)GEN-14
OTS $1.00

PB-163 949
[Numerical Analysis Research] Univ. of California, Los Angeles.
JOB SHOP SCHEDULING: AN APPLICATION OF LINEAR PROGRAMMING. Industrial Logistics Research Project
Ross T. Nelson. 1 Mar 54, 18p
[Contract Nonr-233(02)]
Research rept. no. 28; AD-147 549
OTS $1.60

DESCRIPTORS: *Linear programming, *Industrial research, Logistics, Operations research, *Management engineering

A typical small scale job shop scheduling problem is developed, analyzed, and solved by use of linear programming to suggest the following potential applications in industry: (1) Development of optimum feasible programs, i.e., programs which can actually be scheduled. (2) Evaluation and comparison of various possible work schedules. (3) Evaluation and comparison of possible alternate job routings. Although the exact formulation of the scheduling problem will vary for different industrial situations, the attempt here has been to consider the basic, common elements of job shop scheduling. The goal is not to solve a particular industrial problem but, rather, to introduce a technique of analysis independent of circumferential details. (Author)

PB-163 982
Planning Research Corp., Los Angeles, Calif.
BAYES AND MAXIMUM LIKELIHOOD POLICIES FOR A MULTI-ECHELON INVENTORY PROBLEM
Yoichiro Fukuda. 17 Jun 60, 47p
Contract Nonr-2713(00)
PRC R-161; AD-251 538
OTS $4.60

DESCRIPTORS: *Operations research, *Statistical distributions, Scheduling, Management engineering, Materials,

An analysis was made of a dynamic multi-echelon inventory problem in which the demand distribution contains an unknown statistical parameter. If an a priori Bayes distribution of the parameter is assumed known and is to be successively modified on the basis of additional demand information, there is obtained a Bayes inventory policy which is optimal under the specified a priori Bayes distribution. If the unknown statistical parameter is to be estimated by the maximum liklihood estimator based on the past demand, there is obtained a maximum likelihood policy which is an approximation to the optimal policy. Each policy is characterized by a single critical number at each period in each echelon under the linear cost assumption. With some additional restrictions each critical number is represented as a linear function of the total past demand. (Author)

PB-163 983
Planning Research Corp., Los Angeles, Calif.
OPTIMAL DISPOSAL POLICIES
Yochiro Fukuda. 28 Mar 60, 44p
Contract Nonr-2713(00)
PRC R-152; AD-251 536
OTS $4.60

DESCRIPTORS: *Supplies, *Naval supplies, Disposal, *Scheduling, *Naval procurement, *Procurement, Mathematical analysis, Costs.

An inventory model is analyzed in which the disposal of surplus items is taken into consideration as well as the purchase of stock in anticipation of future demand. The main concern is to formulate the optimal ordering and disposal policy in a simple form, and it is assumed that the decision to be made at the beginning of each period is always one of the following: (1) ordering; (2) disposal; and (3) no ordering and no disposal. The single installation model is treated through the standard dynamic programming formulation, and the multiple installation model is treated by the method of implied penalty. The simple optimal policies are explicitly determined under various sets of assumptions on the cost structure of the inventory model. (Author)

Computing Devices

WAPD-TM-370
Bettis Atomic Power Lab., Pittsburgh, Pa.
SHLOG: A DATA RETRIEVAL PROGRAM FOR THE PHILCO-2000
H. Bohl, Jr., and B. P. Peterson. Sep 63, 55p
Contract AT(11-1)GEN-14
OTS $1.25

N64-11077
Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF TECHNIQUES FOR IMPROVING THE RELIABILITY OF DIGITAL SYSTEMS THROUGH LOGICAL REDUNDANCY, PHASE III. Final rept.
Jack Goldberg, J. A. Baer and R. C. Minnick. Aug 63, 150p
Contracts NASw-6 and NAS7-100, subcontract
SRI proj. 3196; NASA CR-52605
OTS $11.50

MECHANICS

N64-11328
Geophysics Corp. of America, Bedford, Mass.
EXTENSION OF THE LOW PRESSURE LIMIT OF MCLEOD GAUGES. Final rept.
W. Kreisman. Mar 63, 74p
Contract NAS1-2217
GCA Technical rept. no. 63-8-N; NASA CR-52877
OTS $7.60

AD-277 144
Institute of Aerophysics, Univ. of Toronto (Canada).
A STATE-OF-THE-ART SURVEY OF SOME ASPECTS OF THE MECHANICS OF RAREFIED GASES AND PLASMAS. Interim technical rept. no. 3 on Aerothermodynamic Investigations in High Speed Flow
G. N. Patterson, May 62, 168p
Contract AF33(616)6990
ARL 62-353
OTS $12.00

DESCRIPTORS: *Gas flow, *Plasma physics, Mechanics, *Superaerodynamics, *Molecular beams, *Kinetic theory, Equations,

A survey of the mechanics of rarefied gases and plasmas: properties of molecules and their motion, distribution function, molecular scattering properties of molecular collisions, Boltzmann equation, Maxwell transfer equations, molecular equilibrium and entropy, Boltzmann equation for free-molecule flow, reflection phenomena, orifice pressure probe, free-molecule aerodynamics, free flux in a tube, molecular beams, Boltsmann relation as an integral equation, kinetic model of the Boltzmann equation, basic equations for an isolated body in near-free-molecule flow, some properties of charged particles in electric and magnetic fields, field equations, four-potential, Hamilton's canonical equations, relativistic Boltzmann equation for collision-free ensemble of charged particles, non-relativistic Boltzmann equation - collisions, equilibrium state. (Author) (See also AD-258 966)

NASA-TN-D-2089
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
STABILITY OF FREE-CONVECTION BOUNDARY-LAYER FLOWS
Philip R. Nachtsheim. Dec 63, 41p
N64-11905
OTS $1.00

NASA-TR-R-185
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AERODYNAMIC HEATING OF CONICAL ENTRY VEHICLES AT SPEEDS IN EXCESS OF EARTH PARABOLIC SPEED
H. Julian Allen, Alvin Seiff, and Warren Winovich. Dec 63, 99p
N64-12107
OTS $2.25

NASA-TN-D-1980
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SHOCK ENVELOPES OF BLUNT BODIES AT LARGE ANGLES OF ATTACK
George E. Kaatari. Dec 63, 43p
N64-11897
OTS $1.25

NASA-TN-D-2064
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A STUDY OF THE CONVECTIVE AND RADIATIVE HEATING OF SHAPES ENTERING THE ATMOSPHERES OF VENUS AND MARS AT SUPERORBITAL SPEEDS
Fred A. Demele. Dec 63, 31p
N64-11903
OTS $0.75

NASA-MEMO-12-24-58A
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SUBSONIC AERODYNAMIC CHARACTERISTICS OF SEVERAL BLUNT, LIFTING, ATMOSPHERIC-ENTRY SHAPES
Howard F. Savage and Bruce E. Tinling. Jan 59, declassified 8 Feb 63. 32p
N63-13889
OTS $1.00

NASA-TN-D-2037
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF A SPOILER-SLOT-DEFLECTOR CONTROL ON A 45° SWEPT-BACK-WING-FUSELAGE MODEL AT HIGH SUBSONIC SPEEDS
Alexander D. Hammond, Nov 63, 78p
N64-10617; NASA TM-X-205, superseded
OTS $2.00

NASA-TN-D-2018
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ANALYSIS OF JET-PLUMING INTERFERENCE BY COMPUTER SIMULATION OF MEASURED FLIGHT MOTIONS OF TWO RAM A FOURTH STAGES
William F. Hinson and Sherwood Hoffman. Dec 63, 44p
N64-11552
OTS $1.25

NASA-TN-D-2048
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
BOUNDARY-LAYER VELOCITY PROFILES AND SKIN FRICTION DUE TO SURFACE ROUGHNESS ON AN OGIVE CYLINDER AT MACH NUMBERS OF 1.61 AND 2.01
K. R. Czarnecki and William J. Monta. Dec 63, 42p
N64-11555
OTS $1.00

NASA-TN-D-2051
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
COMPARATIVE EVALUATION OF METHODS FOR PREDICTING FLUTTER AND DIVERGENCE OF UNSWEPT WINGS OF FINITE SPAN
E. Carson Yates, Jr. and Samuel R. Bland. Dec 63, 55p
N64-11902
OTS $1.50

NASA-TN-D-2023
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DESCRIPTION AND INITIAL CALIBRATION OF THE LANGLEY HOTSHOT TUNNEL WITH SOME REAL-GAS CHARTS FOR NITROGEN
Fred M. Smith, Edwin F. Harrison, and Pierce L. Lawing. Dec 63, 59p
N64-12103
OTS $1.50

N63-18046
Langley [Research Center, National Aeronautics and Space Administration, Langley Station] Va.
DYNAMIC LATERAL BEHAVIOR OF HIGH-PERFORMANCE AIRCRAFT
Martin T. Moul and John W. Paulson. 6 Aug 58, declassified 12 Jun 63. 11p
Research memo. RM L58E16
OTS $1.60

NASA-TN-D-2047
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF DIFFERENTIAL PRESSURE, THERMAL STRESS, AND BUCKLING ON FLUTTER OF FLAT PANELS WITH LENGTH-WIDTH RATIO OF 2
Sidney C. Dixon and Charles P. Shore. Dec 63, 20p
N64-11901
OTS $0.50

NASA-TN-D-2050
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF FLANK LOSSES IN THE THEORY OF SPACE-PROBE ENTRY UNDER CONDITIONS OF HIGH MASS LOSS
Frederick C. Grant, Dec 63, 39p
N64-11192
OTS $1.00

N63-14772
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN EXPERIMENTAL STUDY OF THE FLUTTER OF SAILS HAVING A DELTA PLANFORM TESTED FROM A MACH NUMBER OF 0.1 TO A MACH NUMBER OF 1.9
Robert W. Hess, Mar 61, declassified 12 Mar 63. 40p
Technical memo. X-355
OTD $3.60

NASA-TN-D-2013
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FULL-SCALE WIND-TUNNEL TEST OF THE VZ-2 VTOL AIRPLANE WITH PARTICULAR REFERENCE TO THE WING STALL PHENOMENA
Robert G. Mitchell. Dec 63, 60p
N64-11550
OTS $1.50

N63-17465
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF THE ROLLING STABILITY DERIVATIVES OF TWO HYPERSONIC GLIDERS OF PARABOLIC PLAN FORM AT HIGH SUBSONIC SPEEDS
Donald D. Arabian. Apr 60, declassified 3 Apr 63. 48p
Technical memo X-268
ORS $4.60

N63-18044
Langley [Research Center, National Aeronautics and Space Administration, Langley Station] Va.
STATIC STABILITY AND CONTROL OF HYPERSONIC GLIDERS
Robert W. Rainey. 7 Jul 58, declassified 12 Jun 63. 16p
Research memo. RM L58E12a
OTS $1.60

NASA-TN-D-2034
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SUBSONIC AERODYNAMIC HEAT TRANSFER TO A SURFACE RECESSED WITHIN A FORWARD STAGNATION REGION SLIT
Samuel J. Scott. Dec 63, 11p
N64-11899
OTS $0.50

NASA-TM-X-246
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC AERODYNAMIC CHARACTERISTICS OF A MODEL OF A PROPOSED SIX-ENGINE HULL-TYPE SEAPLANE DESIGNED FOR SUPERSONIC FLIGHT
Dewey E. Wornom. Mar 60, declassified 15 Mar 61, 38p
OTS $0.75

NASA-TN-D-2033
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC INVESTIGATION OF A PYRAMIDAL REENTRY CONFIGURATION WITH CAMBERED VARIABLE-SWEEP WINGS AND VARIOUS LONGITUDINAL CONTROLS
Bernard Spencer, Jr. Dec 63, 57p
N64-11554
OTS $1.50

Hydrodynamics

PB-163 961
[Hydrodynamics Lab.] Calif. Inst. of Tech., Pasadena.
A NOTE ON THE CAVITY FLOW PAST A HYDROFOIL IN A LIQUID WITH GRAVITY
Blaine R. Parkin. Dec 57, 49p
Contract Nonr-220(12)
Rept. no. 47-9; AD-158 853
OTS $4.60

DESCRIPTORS: *Hydrofoils, Planing surfaces, Fluid dynamic properties, *Cavitation, Liquids, Gravity.

The effects of gravity on the full cavity flow developed from a flat plate hydrofoil are examined by extending Tulin's linearized theory of cavity flows. In general, these effects are appreciable only in the case of low Froude number and the present theory applies only to those flows in this Froude number range for which the effects of gravity may be regarded as being of the first order in smallness. The procedure given here is not capable of giving a complete description of cavity flows with large buoyant effects. From the theory, numerical results are given which show the effect of gravity on hydrofoil pressures, forces and cavity shape. (Author)

Pneumatics

AD-417 224 repriced
Naval Ordnance Lab., White Oak, Md.
THE N.O.L. 10,000 ATM. BALLISTIC PISTON COMPRESSOR. I. DESIGN AND CONSTRUCTION
George T. Lalos. Sep 63, 20p
NOLTR-63-96
OTS $0.50

DESCRIPTORS: *High pressure compressors, *Gases, High pressure research, High temperature research, Density, Tests, Pistons, Compressor parts, Design, Construction,

An apparatus is described which makes possible the rapid and momentary compression of a test gas from atmospheric pressure to a maximum pressure of 10,000 atmospheres. Accompanying temperatures are of the order of magnitude of 10,000 K and depend on the test gas and the initial conditions. This ballistic piston compressor is specifically designed for the study of the nature of the radiation emitted by extremely hot dense gases. Idealized calculations are presented of the relative density, temperature, volume of the hot dense gas sample, and reservoir pressure for the test gas pressure range of one to 10,000 atmospheres. (Author)

METALLURGY

BNL-811
Brookhaven National Lab., Upton, N. Y.
THE INVESTIGATION OF CONTAINER MATERIALS FOR Bi AND Pb ALLOYS. PART I. THERMAL CONVECTION LOOPS.
A. J. Romano, C. J. Klamut, and D. H. Gurinsky.
Jul 63, 28p
Contract [AT(30-2)GEN-16]
T-313
OTS $0.75

N64-10341
Lockheed-Georgia Co. Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES. PEDIGREES OF METALS AND ALLOYS
C. A. Schwanbeck, Sep 63, 41p
Contract NASw-114
ER-5542, add.; NASA CR-52533
OTS $4.60

NMI-1258
Nuclear Metals, Inc., Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. HIGH-TEMPERATURE PROPERTIES OF REFRACTORY ALLOYS.
Final rept. 1 Jul 62-30 Jun 63.
A. L. Geary. 17 Sep 63, 67p
Contract AT(30-1)2784
OTS $1.75

Light Metals

PB-165 024
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF MAGNESIUM-LITHIUM BASE ALLOYS FOR LIGHT-WEIGHT ARMOR PLATE APPLICATIONS. Monthly progress rept. nos. 3 and 4
L. W. Eastwood and J. H. Jackson. 8 Dec 49, 5p
Contract NOas 9526
AD-206 725
OTS $1.10

Brief reports on processing 3/8 inch by 6-inch plate.

DESCRIPTORS: *Armor plate, *Magnesium alloys, *Lithium alloys, Aluminum alloys, Metal plates,

PB-165 022
[IIT Research Inst.] Chicago, Ill.
DISPERSION HARDENING OF SINTERED TITANIUM ALLOYS BY REFRACTORY METAL POWDER ADDITIONS. Rept. no. 9
Robert H. Read and Cord H. Sump. 29 May 57, 15p
Contract [NOas]-55-952-c
ARF Proj. no. B 093; AD-139 794
OTS $1.60

DESCRIPTORS: *Powder metallurgy, *Titanium alloys, Aluminum alloys, Molybdenum alloys, *Dispersion hardening, Refractory materials, *Thorium compounds, Oxides, *Tungsten, Microstructure, Hardness.

An investigation is being made of the dispersion strengthening of Ti alloys through powder metallurgical techniques. The refractory materials chosen for dispersion in Ti are ThO_2 and W. Tungsten is being dispersed by milling W powder together with Ti hydride powder, while ThO_2 is being dispersed by the internal oxidation of Ti-Th alloy powders. Tungsten-reinforced composites were prepared with both Ti and Ti-4% Al-4% Mo as the base metals. These powders were cold-pressed and sintered at various temperatures between 1560° and 2250°F. The following observations were made on these specimens: (1) high density (above 95% was achieved even at the lowest temperatures; (2) all the specimens were very brittle and had hardness values near 600 VHN (20 kg load); and (3) microscopic study revealed a fine uniform, and dispersed phase structure. Attempts to obtain transformation by head-treatments showed no gross hardness change. Several Ti-Th alloys were prepared for the further investigation of internal oxidation of alloy powders. (See also PB-132 460)

Corrosion

NASA-TN-D-2011
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE RELATIVE SUSCEPTIBILITY OF FOUR COMMERCIAL TITANIUM ALLOYS TO SALT STRESS CORROSION AT 550°F
David N. Braski and George J. Heimerl, Dec 63, 25p
N64-11245
OTS $0.75

PB-163 962
Naval Boiler and Turbine Lab., Philadelphia, Pa.
FUEL OIL ASH CORROSION RESISTANCE OF "KANTHAL" ALLOY.
Evaluation rept.
J. R. Witmeyer. 26 Jun 57, 20p
NBTL Test R-253; AD-143 765
OTS $1.60

DESCRIPTORS: *Corrosion-resistant alloys, *Fuel oil, Ash, Iron alloys, *Chromium alloys, Nickel alloys, Boilers, Graphic analysis.

The relative resistance of Kanthal, 60Cr:40Fe, 60Cr:40Ni, 50Cr:50Ni and 25Cr:20Ni alloys to corrosion by synthetic fuel oil ash was tested. A crucible type test was conducted at 1700°, 2000° and 2200°F using high sodium and high vanadium corrodents. In the high vanadium corrodent at the three test temperatures and in the high sodium corrodent at 2000°F, the 60Cr:40Fe displayed the best corrosion resistance followed by 60Cr:40Ni, 50Cr:50Ni, then Kanthal and the least resistant being 25Cr:20Ni alloy. At 1700°F in the high sodium corrodent, the Kanthal was the most resistant. The Kanthal was definitely superior to the other metals in the 690 hours oxidation test. Oxidation of the Kanthal did not decrease its corrosion resistance. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-6787
Argonne National Lab., Ill.
TRANSPORT SOLUTIONS TO THE MONOENERGETIC CRITICAL PROBLEMS
George J. Mitsis. Nov 63, 170p
Contract W31-109-eng-38
OTS $2.75

TID-6613 (Suppl. 4)
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension.
RADIOISOTOPES IN WORLD INDUSTRY. Abstracts of selected foreign literature. Jul 63, 165p
OTS $2.75

WAPD-276
Bettis Atomic Power Lab., Pittsburgh, Pa.
THE EMANATION OF RADON-220 FROM SINTERED UO_2 POWDERS AND PLATES
J. C. Clayton and S. Aronson. Oct 63, 28p
Contract AT(11-1)GEN-14
OTS $0.75

BNL-806
Brookhaven National Lab., Upton, N. Y.
ANNUAL REPORT NO. 14, JULY 1, 1962-JUNE 30, 1963. 1 Jul 63, 209p
Contract AT(30-2)GEN-16
AS-17
OTS $3.00

K-1542
Oak Ridge Gaseous Diffusion Plant, Tenn.
MEASURING U^{235} BY MASS SPECTROMETER COMPARISON TO U^{233} INTERNAL STANDARDS
O. C. Smitherman. 16 Dec 63, 7p
Contract W7405-eng-26
OTS $0.50

Nuclear Engineering

ANL-6659
Argonne National Lab., Ill.
BREEDING-GAIN SPECIMENS FOR EBR-I CORE IV
A. B. Shuck, A. G. Hins, W. R. Burt and R. A. Beatty. Sep 63, 35p
Contract W31-109-eng-38
OTS $0.75

ANL-6702
Argonne National Lab., Ill.
HEAT CAPACITY STUDIES OF URANIUM AND URANIUM-FISSIUM ALLOYS
Howard Savage and Richard D. Seibel. Sep 63, 28p
Contract W31-109-eng-38
OTS $0.75

ANL-6706
Argonne National Lab., Ill.
IDAHO DIVISION. Summary rept. Oct 61-Sep 62. [1963] 160p
Contract W31-109-eng-38
OTS $2.75

ANL-6550
Argonne National Lab., Ill.
THE MANUFACTURE OF SUPPLEMENTAL DEPLETED FUEL RODS FOR FCF STARTUP
N. J. Carson, Jr., H. F. Jelinek, and A. B. Shuck. Sep 63, 29p
Contract W31-109-eng-38
OTS $0.75

ANL-6678
Argonne National Lab., Ill.
PRELIMINARY IRRADIATIONS OF PuC AND UC-PuC
J. H. Kittel, L. A. Neimark, R. Carlander, O. L. Kruger, and R. C. Lied. Sep 63, 15p
Contract W31-109-eng-38
OTS $0.50

TID-18605
Associated Nucleonics, Inc., Garden City, N. Y.
CONCEPTUAL DESIGN STUDY OF A MOBILE GAMMA IRRADIATOR FOR FRUIT PRODUCE. 31 May 62, 115p
OTS $2.50

TID-3544(Rev. 1)
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension.
LIQUID METAL TECHNOLOGY. A literature search.
James M. Jacobs, comp. Aug 63, 143p
OTS $2.50

TID-7663 (Bks. 1-3)
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension
PROCEEDINGS OF THE CONFERENCE ON LIGHT-WATER-MODERATED RESEARCH REACTORS HELD AT GATLINBURG, TENNESSEE, JUNE 11-14, 1962. Oct 63, 1313p
OTS $13.00 Set

TID-6506(Pt. 1, 2nd Ed.)
Atomic Energy Commission, Washington, D. C.
SUMMARIES OF FUELS AND MATERIALS DEVELOPMENT PROGRAMS
William L. R. Rice, ed. Mar 63, 266p
OTS $3.50

NAA-SR-8621
Atomics International, Canoga Park, Calif.
THE AGE OF FISSION NEUTRONS TO INDIUM RESONANCE ENERGY IN WATER. PART I. EXPERIMENT.
R. K. Paschall. 30 Nov 63, 38p
Contract AT(11-1)GEN-8
OTS $0.75

NAA-SR-7880
Atomics International, Canoga Park, Calif.
DESIGN AND DEVELOPMENT OF THE SAFETY-ROD DROP-TIME TEST SYSTEM
J. G. Radcliff. 31 Oct 63, 15p
Contract AT(11-1)GEN-8
OTS $0.50

NAA-SR-7534
Atomics International, Canoga Park, Calif.
FLOW CONTROLLER EVALUATION FOR SODIUM SERVICE
R. A. Winborne. 30 Nov 63, 36p
Contract AT(11-1)GEN-8
OTS $0.75

NAA-SR-8722
Atomics International, Canoga Park, Calif.
PIQUA NUCLEAR POWER FACILITY OPERATIONS ANALYSIS PROGRAM. Progress rept. no. 2, Fiscal Year 1963.
J. J. Auleta, D. B. Finch, L. Goodman, D. E. Lew, and H. Mandel. 30 Nov 63, 176p
Contract AT(11-1)GEN-8
OTS $2.75

NAA-SR-7696
Atomics International, Canoga Park, Calif.
A STUDY OF URANIUM CARBIDE AND CLADDING MATERIALS FOR HIGH-TEMPERATURE SODIUM-COOLED REACTORS
R. D. Hahn. 15 Mar 63, 32p
Contract AT(11-1)GEN-8
OTS $0.75

WAPD-TM-375
Bettis Atomic Power Lab., Pittsburgh, Pa.
CLEANING ZIRCALOY COMPONENTS FOR PRESSURE BONDING
J. Weber, R. Lloyd, and W. L. Frankhouser. Sep 63, 38p
Contract AT(11-1)GEN-14
OTS $1.00

BNL-827
Brookhaven National Lab., Upton, N. Y.
CHEMONUCLEAR FISSION FRAGMENT SOURCE AND FUEL ELEMENT DEVELOPMENT. Progress rept.
Meyer Steinberg and Gerald Farber. Oct 63, 18p
Contract [AT(30-2)GEN-16]
T-322
OTS $0.50

NYO-10398
Cleveland Pneumatic Tool Co., Ohio.
DESIGN STUDY OF FLUID ENGINE POWER SYSTEMS
C. H. Baker, T. A. Hunter, R. S. Pauliukonis, and A. V. Pradhan. 12 Apr 63, 284p
Contract AT(30-1)3022
OTS $3.50

GEAP-3924
General Electric Co., San Jose, Calif.
NUCLEAR SUPERHEAT PROJECT. Quarterly rept. no. 11, Jan-Mar 62.
R. T. Pennington. Aug 62, 295p
Contract AT(04-3)189
OTS $4.00

GEAP-4153
General Electric Co., San Jose, Calif.
NUCLEAR SUPERHEAT PROJECT. Quarterly rept. no. 14, Oct-Dec 62.
R. T. Pennington. 15 Jan 63, 281p
Contract AT(04-3)189
OTS $3.50

HW-77356
Hanford Atomic Products Operation, Richland, Wash.
INVESTIGATION OF CHEMICAL CLEANING AND STARTUP OPERATIONS PROPOSED FOR N-REACTOR
A. P. Larrick, T. F. Demmitt, and V. F. Fitzpatrick. Mar 63, 26p
Contract AT(45-1)1350
OTS $0.75

PB-163 963
Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
BERYLLIUM CARBIDE
H. A. Dorfman, comp 1 Jul 50, declassified 4 Dec 50, 82p
NEPA rept. no. 1519
OTS $8.10
DESCRIPTORS: *Beryllium compounds, *Carbides, *Reactor materials, Metallography, Reactor fuels, Sintering,

The report is a compilation of pertinent data available as of December, 1949, covering the properties, preparation, and fabrication of beryllium carbide. Physical property data included have been hitherto accessible only in scattered papers. Powder metallurgy and hot-pressing techniques are detailed. A complete section describes the effects of additions of other elements and compounds to beryllium carbide. (Author)

PWAC-384
Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
DESIGN SUMMARY REPORT OF LCRE REFLECTOR COOLANT PUMPS AND SUMP
C. Ferguson, L. K. Knudsen, R. P. Lamers, B. R. Lucas, and D. V. Manfredi. 16 Dec 63, 39p
Contract AT(30-1)2789
OTS $1.00

DP-857
Savannah River Lab., Aiken, S. C.
FORCED-FLOW BOILING IN ROD BUNDLES AT HIGH PRESSURE
Bruce Matzner (Columbia Univ.) and John S. Neill (E. I. du Pont de Nemours, and Co., Inc.) Sep 63, 44p
Contracts AT(07-2) and AT(30-3)187
OTS $1.00

Waste Disposal

HW-79140
Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT ACTIVITIES. FIXATION OF RADIOACTIVE RESIDUES. Quarterly progress rept. Jul-Sep 63.
E. R. Irish, ed. Oct 63, 37p
Contract AT(45-1)1350
OTS $1.00

LAMS-2937
Los Alamos Scientific Lab., N. Mex.
RADIOACTIVE GASEOUS EFFLUENTS FROM A HOMOGENEOUS REACTOR
Dale E. Hankins. Jun 63, 45p
Contract W7405-eng-36
OTS $1.00

PHYSICS

Acoustics

NASA-TN-D-2025
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE NONLINEAR RESPONSE OF WINDOWS TO RANDOM NOISE
Henry S. Freynik, Jr. Dec 63, 22p
Part of the inform. in this report previously published in Sound, v. 2, no. 3, May-Jun 63, p. 31-33
N64-11898
OTS $0.50

Electricity

AD-288 073
Aireseárch Mfg. Co., Los Angeles, Calif.
THERMOKINETIC ION CONVERTER STUDY. Final rept., 28 Feb 61-19 Feb 62
R. Parthasarathy and A. L. Vodopia. Jun 62, 94p
Contract AF33(616)7894
Rept. no. SS-689-R; ASD-TDR-62-285
OTS $8.60

DESCRIPTORS: *Electric power production, *Gas ionization, *Gas flow, *Ion exchange, *Convection, Kinetic theory, Flames, Ions, *Thermionic converters

This report presents an analytical as well as experimental study on extracting electrical power from an ionized gas stream. Included in this report are a literature survey on ion convection generators, principles of ionization with reference to effects of non-equilibrium conditions, space charge neutralization studies, one dimensional flow of an ionized gas and interaction of ions and neutrals. A description of the converter design and a detailed discussion of the experimental results are presented in this report. (Author)

Electronics

MATT-Q-20
Plasma Physics Lab., Princeton Univ., N. J.
SEMIANNUAL REPORT, JULY 1, 1962-DECEMBER 31, 1962
13 Mar 63, 231p
Contract AT(30-1)1238
OTS $3.00

Magnetism

NASA-TN-D-2083
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
ANISOTROPIC EFFECTS IN HELICALLY WOUND SUPERCONDUCTING SOLENOIDS
Edmund E. Callaghan. Dec 63, 15p
N64-11194
OTS $0.50

Optics

N64-10108
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE S-66 LASER SATELLITE TRACKING EXPERIMENT
Henry H. Plotkin. 13 Feb 63, 24p
X-524-63-59; X-52075
OTS $2.60

Presented at the 3rd International Conference on Quantum Electronics, Paris, Feb 13, 1963.

N64-10089
IIT Research Inst., Chicago, Ill.
INVESTIGATION OF LIGHT SCATTERING IN HIGHLY REFLECTING PIGMENTED COATINGS. Quarterly rept., 1 Jul-1 Oct 63
G. A. Zerlaut, S. Katz, and J. Stockham. 11 Oct 63, 30p
Contract NASr-65(07)
Report no. IITRI-C6018-3; NASA CR-52187
OTS $2.60

N64-11109
Philco Corp., Blue Bell, Pa.
THEORETICAL AND EXPERIMENTAL INVESTIGATION ON MODULATION INDUCING RETRODIRECTIVE OPTICAL SYSTEMS. Monthly contract progress rept. no. 4, 21 Aug-21 Sep 63
B. W. Harned and M. E. Lasser. 26 Sep 63, 8p
Contract NASw-721
NASA-CR-52859
OTS $1.10

Solid State Physics

LAMS-2965
Los Alamos Scientific Lab., N. Mex.
TOTAL OPTICAL EMISSIVITY AND ELECTRICAL RESISTIVITY OF $(U_{0.3}Zr_{0.7})C$ IN THE TEMPERATURE RANGE 1400°K TO 2800°K
L. D. Tatro and L. W. Miller. 1 Sep 63, 15p
Contract W7405-eng-36
OTS $0.50

N63-13534
Radio Corp. of America, Camden, N. J.
PROTON RADIATION DAMAGE STUDY. Monthly progress rept. no. 2, 1 Jun-1 Jul 62
James Vollmer and D. A. Gandolfo. [1962] 16p
Contract NAS1-1654
Available on loan from OTS

Wave Propagation

NASA-TN-D-2043
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CALCULATED RADIO ATTENUATION DUE TO PLASMA SHEATH ON HYPERSONIC BLUNT-NOSED CONE
John S. Evans and Paul W. Huber. Dec 63, 32p
N64-11900
OTS $0.75

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

AD-402 217
Poulter Labs., Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES. Technical summary rept. no. 2
D. D. Keough. 15 Jan 63, 58p
Contract DA49-146-XZ-096
SRI Proj. no. PGU-3713; ARPA Order no. 172-61
OTS $5.60

DESCRIPTORS: *Piezoelectric transducers, Piezoelectric gages, Pressure, Wire, Electric insulation, Alloys, Epoxy plastics, Hydrodynamics, *Shock waves, Materials, Design, Tests, Theory,

Because previous work had determined the suitability of several alloys and a possible insulator, considerable effort was spent on utilizing these as gage components in order to provide a gage, not necessarily optimum, for early field tests. As work progressed, it became apparent that neither the alloys nor the insulator would be adequate. Two other alloys were selected; one suitable for a low shock impedance gage and the other for a high shock impedance gage. The low impedance alloy, 60% Li 40% Mg, was not tested due to fabrication difficulties. The high impedance alloy, Manganin, was tested extensively and used in a suitable insulator, C-7, to provide a gage capable of 0.06 μsec response, calibrated to 150-kb pressure (in the insulator) and a recording duration of ~20 μsec. Gage fidelity tests were made by comparing experimental results with theoretical predictions of shock wave attenuation in the test pressure sources. Field test gages and associated circuitry were designed and tested. (Author)

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